JUDAIC LOGIC

A FORMAL ANALYSIS OF BIBLICAL, TALMUDIC AND RABBINIC LOGIC

Avi Sion, Ph. D.

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À mes deux sœurs et leurs familles.

"He who wishes to attain to human perfection,
must therefore first study Logic...

My son, so long as you are engaged in studying... Logic,
you belong to those who go around the palace in search of the gates."

(Moses Maimonides: *Guide for the Perplexed.*)

"I read [Judaic Logic] with great interest.
It is a very important book, which has its place in every Jewish library."

(Prof. Ely Merzbach, Bar Ilan University, editor of *Higayon*.)

ABSTRACT.

Judaic logic: A Formal Analysis of Biblical, Talmudic and Rabbinic Logic is an original inquiry into the forms of thought determining Jewish law and belief, from the impartial perspective of a logician[1].

Judaic Logic attempts **to honestly estimate the extent to which the logic employed within Judaism fits into the general norms, and whether it has any contributions to make to them**. The author ranges far and wide in Jewish lore, finding clear evidence of both inductive and deductive reasoning in the Torah and other books of the Bible, and analyzing the methodology of the Talmud and other Rabbinic literature **by means of formal tools** which make possible its objective evaluation with reference to scientific logic. The result is a highly innovative work - incisive and open, free of clichés or manipulation.

Judaic Logic succeeds in translating vague and confusing interpretative principles and examples into formulas with the clarity and precision of Aristotelian syllogism. Among the positive outcomes, for logic in general, are a thorough listing, analysis and validation of the various forms of **a-fortiori argument**, as well as a clarification of **dialectic logic**. However, on the negative side, this demystification of Talmudic/Rabbinic modes of thought (hermeneutic and heuristic) reveals most of them to be, contrary to the boasts of orthodox commentators, far from deductive and certain. They are often, legitimately enough, inductive. But they are also often unnatural and arbitrary constructs, supported by unverifiable claims and fallacious techniques.

> Many other thought-processes, used but not noticed or discussed by the Rabbis, are identified in this treatise, and subjected to logical review. Various more or less explicit Rabbinic doctrines, which have logical significance, are also examined in it. In particular, this work includes a formal study of the **ethical logic** (deontology) found in Jewish law, to elicit both its universal aspects and its peculiarities.
>
> With regard to Biblical studies, one notable finding is an explicit formulation (which, however, the Rabbis failed to take note of and stress) of **the principles of adduction**[2] in the Torah, written long before the acknowledgement of these principles in Western philosophy and their assimilation in a developed theory of knowledge. Another surprise is that, in contrast to Midrashic claims, the Tanakh (Jewish Bible) contains a lot more than ten instances of *qal vachomer* (a-fortiori) reasoning.

In sum, *Judaic Logic* elucidates and evaluates the epistemological assumptions which have generated the Halakhah (Jewish religious jurisprudence) and allied doctrines. Traditional justifications, or rationalizations, concerning Judaic law and belief, are carefully dissected and weighed at the level of logical process and structure, without concern for content. This foundational approach, devoid of any critical or supportive bias, clears the way for a timely reassessment of orthodox Judaism (and incidentally, other religious systems, by means of analogies or contrasts). *Judaic Logic* ought, therefore, to be read by all Halakhists, as well as Bible and Talmud scholars and students; and also by everyone interested in the theory, practice and history of logic.

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[1] Avi Sion is the author of ***Future Logic: Categorical and Conditional Deduction and Induction of the Natural, Temporal, Extensional and Logical Modalities***, which is a large-scale study in generic formal logic and epistemology.

[2] The testing, and confirmation or rejection, of hypotheses - i.e. of beliefs, and equally of the reasons or explanations put forward in support of beliefs.

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1. INTRODUCTION.

1. The Development of Jewish Law.

Logic in Judaism is mainly used for the determination and application of Jewish law, though also for the interpretation of the stories in holy texts. Before we begin our reflections on Jewish logic, therefore, let us very briefly look into the development of Jewish law. To begin with, we must of course consider how this development is perceived and conceived *within Judaism itself*.

The founding document and proof-text of the Jewish faith and religion is, as is well known, the **Torah** (translated as the Law, or Doctrine). This refers to the Five Books of Moses or Pentateuch (*Chumash*, in Hebrew), which Jews[3] believe was handed down by God[4] to the Jewish people, through Moses, at Mount Sinai[5], some 3,300 years ago. The five books are *Bereshith* (Genesis), *Shemot* (Exodus), *Vayikra* (Leviticus), *Bemidbar* (Numbers), *Devarim* (Deuteronomy).

The Jewish Bible, or **Tanakh**, consists of this 5-volume Torah, together with the 8 other prophetic books (of which one includes twelve minor prophets) and 11 other holy scriptures (counting the books of Ezra and Nehemiah as one), written under Divine inspiration over the next 800 years or so, mostly in the land of Israel and in a few cases in the first Babylonian exile. TaNaKh is an acronym, including the initials T of Torah, N of *Neviim* (Prophets) and K of *Ketuvim* (Scriptures); the books of the Bible other than those written by Moses are therefore simply known as the **Nakh**[6]. The latter play a relatively secondary role in the development of Jewish law, being referred to occasionally to resolve certain questions of detail[7] or to provide illustrations.

The **Talmud** (which means, teaching) is an enormous compilation of legal discussions between Rabbis, stretching over several centuries, starting about 2,100 years ago (at least). It

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3 Or believing Jews, if you prefer; and many non-Jews, of course.

4 The names of our Divinity are commonly written incompletely, even in their non-Hebrew forms, so as to avoid their destruction (which is prohibited on the basis of Deut. 12:4) should a copy of the book be damaged. I am not sure that merely leaving out the vowel, as in *G-d* or the *L-rd* in English, suffices, but it at least shows respect. However, as search strings in the Internet such abbreviations cause confusion.

5 Apparently, not only at Mt. Sinai, but also earlier at Marah and later on the plains of Moab. We shall just say 'Sinai', in the way of a collective term. See Lewittes, p. 38.

6 However, sometimes the word Torah is broadened to refer to the whole Tanakh; indeed, sometimes it is used even more broadly to include all Jewish law.

7 The fact that some laws were Prophetic rather than Mosaic in origin is of course a problem, in that Judaism is supposed to be essentially unchanged since Sinai. The Sages explained this by claiming them oral traditions dating from Sinai, which were written down by the prophets, or else forgotten and again revealed to the prophets. See Lewittes, pp. 32-33.

includes two main components: the **Mishnah** (meaning, learning by repetition - pl. *Mishnaiot*), which was edited by R. Yehudah HaNassi in the 1st century CE, followed by the **Gemara** (meaning, completion - pl. *Gemarot*), which was redacted by R. Ashi in the 5th century. Actually, there are two Talmuds: the *Bavli* (or Babylonian), which is the one we just mentioned, and the parallel *Yerushalmi* (or Jerusalem[8]), which was closed in Israel some 130 years earlier, in the 4th century, and carries relatively less authority.[9]

> The Mishnah is divided into six so-called *Sedarim* (Orders - sing. *Seder*)[10], to which there corresponds sixty-three Gemara commentaries called *Masekhtot* (Tractates - sing. *Masekhet*), found in one or both of the Talmuds. The names of the Orders and corresponding numbers of Tractates are as follows: *Zeraim* (Seeds), 11; *Moed* (Appointed Time), 12; *Nashim* (Women), 7; *Nezikin* (Damages), 10; *Kodashim* (Consecrated Objects), 11; *Taharot* (Purities), 12.

Jewish law, or the **Halakhah** (meaning, the Path, or the 'Way to go'), as it stands today, is (as we shall see) the outcome of a long historical process of debate and practice, in which the above mentioned documents, mainly the Torah and the Talmud, have played the leading roles. Jewish law, note, concerns not only interactions between individuals (be they civil, commercial or criminal) and societal issues (communal or national structures and processes), but also the personal behavior of individuals (privately or in relation to God) and collective religious obligations (which may be carried out by selected individuals, such as the priests or Levites).

Many people, not well-acquainted with normative Judaism[11], believe that Jewish law was derived purely and exclusively from the Torah (or, more broadly, perhaps, the Tanakh). In this view, the Torah (or Tanakh) was the totality of God's message to the Jewish people in particular, and Humanity in general; so that only what was explicitly written in it, or strictly deductively inferable from that, qualifies as Divine Will. However, in fact, it would be technically impossible to derive in that way all of existing Jewish law from the Torah (or Tanakh) alone; more data would be required - and more was actually used....

Orthodox Jews believe that, *at the same time* as the Written Torah (*Torah Shebekhtav*) was given, an Oral Torah (*Torah Shebealpeh*) was inaugurated, by Moses, which served to clarify and amplify the written law, by consideration of more specific cases. The existence already in Sinai of an unwritten component to the Law is suggested within the written Torah itself (see, for instance, Exodus, ch. 18). The Tradition (*Hamasoret*, in Hebrew) was, orthodox Jews believe, *faithfully transmitted* across the centuries, through popular practice and verbal repetition, until it was largely committed to writing in the Nakh, the Talmud and other

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[8] Also known as the Palestinian Talmud. 'Palestine' refers to the land of Israel, which at the time was under Roman occupation. Although Jews were then the large majority of the inhabitants, the country was named after the Philistines, a non-Arab people who had by then disappeared.

[9] Nowadays, most editions of the Talmud include a mass of later commentaries and supercommentaries.

[10] The expression ***haShas*** is an acronym for the '*shishah sedarim*' (six orders), and thence a name for the oral law.

[11] I am not here alluding to the Zadokim (Sadducees), or Karaim (Karaites) or even to certain like-minded modern Conservatives and Reformists, who more or less believed that Jewish Law *should* have been derived exclusively from the Torah.

Rabbinical texts. Existing Jewish law, then, claims logical descent from, not only the Written Torah, but also the Oral Torah[12].

It should be noted that, although written laws would seem more reliable than oral laws, nevertheless, some oral laws (for instance, the laws defining Sabbath observance) are considered as equal in force to written laws. Such 'as-if written' oral laws are called *deoraita*, in distinction from oral laws which are regarded as based on Rabbinic authority, called *derabbanan*. This distinction plays an important role in Halakhic decision-making, in the event of doubts concerning the tenor of a law or the facts of a case[13]. A similar distinction is made with reference to inferences from Scripture, those with mere Rabbinic force being classed as *asmakhta*[14].

> What concerns us, in the present study, are the thought-processes which have been used to construct the Halakhah. This issue has several levels. The simplest is an uncritical description of the ways Jewish law is derived from the first principles claimed by Jewish tradition as having been given in the Sinai Revelation, in writing or orally. At a more advanced stage, we will want to determine to what extent these thought-processes, or methods of 'derivation', have been truly logical. And ultimately, we will have to scrutinize more carefully the bases of the 'first principles' themselves - which implies an investigation of hidden or unexplicited thought-processes, which in turn must be assessed from a purely logical point of view.

Let us now look more closely at the course of events, as taught within Judaism. The Torah, written and oral, is supreme, not open to doubt or review. Some aspects of the oral Torah make their appearance in the Nakh, if only incidentally within stories. Next in importance comes the Mishnah, which is the condensed essence of Jewish oral tradition, as it stood at a specific point in time. The Mishnah faithfully reports, not only legal positions generally agreed on by the Rabbis of the time and earlier, but also where they disagree, their points of controversy. The authority of the Rabbis stemmed from the Torah itself; for instance, Deuteronomy 17:8-13 (emphasis added):

> ***If there arise a matter too hard for thee in judgment (...); then shalt thou arise and get thee up, unto the place which the Lord thy God shall choose (...), unto the Levitical priests, and unto the judge that shall be <u>in those days</u>; and thou shalt inquire; and they shall declare unto thee the sentence of judgment (...); and thou shalt observe to do according to all that they shall teach thee.***

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12 Oral transmission may be thought at first less reliable than the written word, but if one thinks about it, there is no real reason to regard documents as any more reliable. Sooner or later, an act of faith is necessary, that the document or the spoken report was indeed of Divine origin. This is the faith of Judaism, as we have said, and we shall take it as our starting point. (Of course, it is to some extent easier to *date* documents than oral traditions, and thus to some extent verify claims concerning their authorship; but there are often difficulties and disagreements, which leave us with doubts, anyway.)

13 See Lewittes, p. 91. But note well that it is *the Rabbis themselves* who tell us which oral laws are *deoraita* and which are *derabbanan*; there is no way to independently audit their pronouncements in this respect, since by definition they refer to oral and not to written laws.

14 See Lewittes pp. 33, 57. This presumably refers to non-deductive inferences, since purely deductive inferences are logically bound to have Biblical force. But it does not follow that only deductive inferences have been granted Biblical force.

The religious authorities were, first of all, the trustees of the oral transmission (many of these people, in the long line since Moses, are identified by name[15]). And secondly, it was foreseen that there would be gaps in knowledge, or changing circumstances, which would require wise and considered judgment by competent and recognized spiritual leaders[16].

The decisions set down in the Mishnah, once it was closed, became binding for all future generations, and thus acquired the status of first principles, like the Scriptures, not open to challenge, and serving as top premises in the inference of further Halakhah. Although the Mishnah provided more practical detail than the Torah, it was written very telegraphically, and therefore could itself give rise to misunderstandings or disagreements. Furthermore, historical events - namely, Roman wars and persecutions, which caused the death of many major Rabbis of the time (known as **Tanaim** - sing. **Tana**) - created serious gaps in the collective memory, as to the Halakhah concerning many issues; and a fear that the still-oral portions of the tradition might be lost.

Such considerations motivated the next generations of Rabbis (known as **Amoraim** - sing. **Amora**), some still in Palestine, but many in Babylonian exile - to compare notes and memories, and debate outstanding issues, and report their collective findings and decisions in writing, in what became known as the Gemara. This was based, then, on an interplay of Torah and Mishnah - as well as, to some extent, on the living memories of eyewitnesses and the unwritten pronouncements of earlier teachers remembered by their later disciples, known as the *Tosefta* (additional material) and *Baraitot* (sing. *Baraita* - material left out of the Mishnah). The latter included lists of hermeneutic principles. Using these three sources, the Rabbis developed the Gemara.

Again, the clear decisions in the Gemara, once made, became binding on all future generations. They in turn became unassailable first principles in the system of inference of Jewish law. The reason for this privilege of earlier authorities is that *they were closer to the source* (the Revelation at Sinai), in touch with a relatively unbroken chain of tradition, compared to succeeding Rabbis. The latter were still left with work to do, however; some questions had been left unanswered, some answers were open to conflicting interpretations, and also new situations arose which required Halakhic decision.

Thus it is that the law developed, layer upon layer; there were the **Savoraim** (6th-7th centuries CE), the **Gaonim** (to the mid-11th century), the **Rishonim** (to the mid-15th century), the **Acharonim** (since the mid-15th century). Each era's Rabbis basing themselves on the decisions and suggestions of their predecessors, *as deductively as they could*, refined and developed the Halakhah. And almost always, the work of previous authorities *acquired the status of well-nigh incontrovertible major premises* for those that came after them. The latter could only comment or codify, or at best fill in gaps left by the former.

However, it should be noted parenthetically that when we today encounter an apparent contradiction between an earlier authority and a later one, we as a rule take the more recent as the more authoritative. It is taken for granted that the latter made his ruling with full awareness of the former's positions. Thus, while in principle the earlier personality has more prestige, in

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15 See, for instance, the *Pirkei Avot*, ch. 1.

16 Philosophers will note that such innovation implies, to some extent, a delegation of *creative powers* by God to the human authorities; for the power to make a legal ruling is nothing less than the power to create *an ethical fact* which was previously non-existent.

practice the later personality *once established as an authority* is more to be relied on. The status of authority is not of course acquired arbitrarily, but is a function of proven scholarship.

> There have been attempts by some Jewish thinkers, at various times, to challenge many of the principles presented above, and try to liberalize the law. Especially of interest to us are the efforts made in this respect over the past couple of centuries, under the influence no doubt of the surrounding European culture of Enlightenment. The authors were generally free-thinking laymen, and there is no denying that most of them eventually gave up many religious observances, if they did not end up totally indifferent to religion. Such philosophers of religion were behind non-Orthodox Jewish movements, including Conservative Judaism, Reform Judaism, and the non-religious Haskalah.[17]
>
> Usually beginning with a critical review of traditional claims, pointing out logical weaknesses or factual inaccuracies or uncertainties, such attempts would often include proposals for legal change, generally with a view to making life easier for Jews, allowing them to adapt more readily to the modern world. However, the authors were in all evidence rather frequently unacquainted with the traditional answers to their questions; furthermore, even when their critique might be convincing, they often allowed themselves to draw conclusions more radical than their premises made possible.
>
> To give an example[18]: one might argue that even acknowledging that Biblical passages like the one cited above (Deut. 17:8-13) effectively grant legislative power to the Tanaim, Amoraim, and subsequent Rabbis, it is not manifestly evident why such past judgments should be *irreversible*. All one might affirm, logically, is that so long as the judges in each generation, appointed by those in the previous generation, continue to confirm these judgments, they hold; otherwise, they would cease to be binding. Claims that the Talmudic generations were necessarily wiser, because closer in time to the Sinai revelation, are rather circular arguments, based on a prejudicially positive evaluation, rather than on a logical connection; one could equally well claim (even if just as prejudicially) that most of these people were rather ignorant and superstitious by modern standards.
>
> However, it must be noted that such objections do not really make possible a breach in the continuity of Rabbinical authority as such. Even if changes in the law, through reassessments of the logic or consideration of new data or new conditions, were in principle permissible, they would have to come specifically *from within* the line of succession of Jewish authority, to be in fact permissible. Anything else would effectively be an illicit attempt to takeover an institution, a misappropriation of the name "Judaism" by a new religion. There is no license to invent (as happened historically) a new line of spiritual guides called "Rabbis", not linked by education *and appointment* to the original line, and unable to claim direct descent from Moses. So long as the legitimate authorities consensually reaffirm the same judgments, they would seem to remain binding.

2. A Logic Primer.

The reader of the present volume does not need to have previously studied logic in depth to be able to follow the discussion fully, but will still need to grasp certain concepts and terminologies. We will try to fulfill this specific task here, while reminding the reader that the subject is much, much wider than that.

Broadly speaking, we refer to any thought process which tends to convince people as 'logical'. If such process continues to be convincing under perspicacious scrutiny, it is

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17 Some of those who ventured to look at Judaism critically ended up converting to other religions.

18 The illustration here given is rough, and should not be taken as a thorough analysis of the issues touched upon, pro or con.

regarded as good logic; otherwise, as bad. More specifically, we consider only 'good' logic as at all logic; 'bad' logic is then simply *il*logical. The loose definition of logic allows us to speak of stupid forms of thought as 'logics' (e.g. 'racist logic'), debasing the term; the stricter definition is more demanding.[19]

Logic, properly speaking, is both an art and a science. As an art, its purpose is the acquisition of knowledge; as a science, it is the validation of knowledge. Many people are quite strong in the art of logic, without being at all acquainted with the science of logic. Some people are rather weak in practice, though well-informed theoretically. In any case, study of the subject is bound to improve one's skills.

Logic is traditionally divided into two - induction and deduction. **Induction** is taken to refer to inference from particular data to general principles (often through the medium of prior generalities); whereas **deduction** is taken to refer to inference from general principles to special applications (or to other generalities). The processes 'from the particular to general' and 'from the general to the particular' are rarely if ever purely one way or the other. Knowledge does not grow linearly, up from raw data, down from generalities, but in a complex interplay of the two; the result at any given time being a thick web of mutual dependencies between the various items of one's knowledge.

Logic theory has succeeded in capturing and expressing in formal terms many of the specific logical processes we use in practice. Once properly validated, these processes, whether inductive or deductive in description, become formally certain. But it must always be kept in mind that, however impeccably these formalities have been adhered to - ***the result obtained is only as reliable as the data on which it is ultimately based***. In a sense, the role of logic is to ponder information and assign it some probability rating between zero and one hundred.

> Advanced logic theory has shown that what ultimately distinguishes induction from deduction is simply the number of alternative results offered as possible by given information: if there is a choice, the result is inductive; if there is no choice, the result is deductive. Deductive logic may seem to give more certain results, but only because it conceals its assumptions more; in truth, it is merely passing on probability, its outputs being no more probable than the least probable of its inputs. When inductive logic suggests some idea as the most likely to be true, compared to any other idea, it is not really leaving us with much choice; it is telling us that in the present context of knowledge, we decisively *have to* follow its suggestion. These are the reasons why the word "proof" is often ambiguous; do we mean deductive proof or inductive proof, and does it matter which we mean?

a. Some propositional forms and their interrelations.

The first task of logicians is to observe actual thought and speech, and take note of recurring linguistic formulas. At first, the variety may seem bewildering; but, starting with the most common and simple items, and gradually considering more detailed issues and more

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[19] We may also speak of 'a logic' in a non-pejorative way, when referring to intelligent forms of thought which are found especially in certain areas of knowledge or scientific fields; e.g. logistics is the logic of willed deployment of (material or mental) objects in space and time, mathematics is the logic of numbers and spatio-temporal relations. Similarly, historians of logic may objectively refer to the logic of (used by or known to) different geographical or cultural groups or periods of history. All specific logics, good or bad, may be subjected to objective study, of course.

complex cases, Logic has grown and matured. A great breakthrough, which we owe to Aristotle (4th century BCE, Greece), was the discovery of an ingenious artifice, which clarified all subsequent discussion. In everyday discourse, we make statements *with specific contents*, like "swans are white"; Aristotle developed logical science by focusing on *forms*, substituting *variables* like "X" and "Y" for specific *values* like "swans" and "white". Such a formal approach signifies that certain aspects of reasoning can be justified without reference to content; they are abstract truths *for all propositions of a certain kind*.

We shall here first consider some of the simplest of the forms called **categorical propositions. (**It is worth memorizing the symbols, traditionally used since the Middle Ages to abbreviate theoretical discussions. **A** and **I** come from the word *affirmo*; **E** and **O**, from *nego* - these are Latin words, whose meanings are obvious. Note that **IO** refers to the sum of **I** and **O**.)

A:	All X are Y.	**E**:	No X is Y.
I:	Some X are Y.	**O**:	Some X are not Y.

IO: Some X are Y *and* Some X are not Y.

"X" and "Y" (or any specific equivalents) are referred to as the ***terms***, the former being called the ***subject*** and the latter the ***predicate***. The relational expressions "is (are)" and "is (are) not" are known as ***copulae***, the former having ***positive polarity*** and the latter ***negative*** (note that the "not" is used here to negate the "is", even though placed after it). Expressions like "all", "some" are called ***quantifiers***: they serve to tell us the extension (i.e. the number or proportion) of the subject which the predication (i.e. copula and predicate) refers to. So much for the various *features* of individual propositions.

A and **E** are characterized as ***general*** (or ***universal***) propositions, because they each concern *the whole* of the subject, each and every instance of it which ever has appeared or may ever appear. **A** may also be expressed in the form "Every X is Y". It should be clear that "No X is Y" means "Every X is-not Y", the only difference between **A** and **E** being the polarity of their copulae. **I** and **O** are called ***particular*** propositions; they each concern *at least part* of the subject, and again differ only in their polarity; note well that such propositions are ambiguous with regard to just *how much* of the subject they address. Often, in practice, we fail to explicitly specify the quantity involved, taking for granted that it is well understood (as in "swans are white"); in case of doubt, such a statement may be dealt with as, minimally, a particular.

IO represents the conjunction of **I** and **O**, and may be classed as (extensionally) ***contingent.*** Though here presented as a compound, **IO** is also a proposition in its own right; it could equally be expressed in exclusive form, as "Only some X are Y" or "Only some X are not Y" (different emphasis, same logical significance). What distinguishes **IO** from its elements **I** and **O**, is that it is more *definite* about quantity than they are. It follows from the various definitions, and it is important to note, that **I** can be interpreted to mean "either **A** or **IO**" (that is, "either All X are Y or Only some X are Y"), and likewise **O** can be read as "either **E** or **IO**" (that is, "either No X is Y or Only some X are not Y").

The foregoing definitions and correlations, together with certain self-evident principles, enable us to infer the following **oppositions**, as they are called. (Note that the expression "opposition", in the specialized sense used in logic, does not necessarily signify conflict, but is intended in the sense of 'face-off'.)

* **A *implies* I**; that is, *the first cannot be true without the second being also true*. Remember that "all" is one of the possible outcomes of "at least some", and therefore conceptually presupposes it. Logic demands ***that we acknowledge the meaning and implications of what we say***[20] (this principle is known as **the Law of Identity**). Likewise, **E** implies **O**; and of course both **I** and **O** are implicit in **IO**. But note that these relations are not reversed: **I** does not imply **A,** nor **IO**; **O** does not imply **E**, nor **IO**.

* **A** and **O** are ***contradictory***; that is, *they cannot be both true and they cannot be both false*, one must be true and the other false. The general statement "All X are Y" tells us that *every single* X is Y, and is therefore incompatible with any claim that "Some X are not Y" which would mean that *one or more* X is not Y; for we must admit that ***nothing can at once and in the same respect both have and not-have a given characteristic*** (this principle is known as **the Law of Non-contradiction**). Also, since ***there is no alternative to either being or not-being*** (this principle is known as **the Law of the Excluded Middle**[21]), we are forced to assert one or the other of our two sentences in any given case. Similarly, **E** and **I** are contradictory.

* **A**, **E** and **IO** are all ***contrary*** to each other, mutually exclusive; that is, *only one of them may be true, and the other two must then be false*. Furthermore, they are taken together ***exhaustive***; that is, *one of them must be true*, since there are no available forms besides them. It follows that the contradictory of the conjunction of **I** and **O** is simply a disjunctive statement of the form "either **A** or **E**"; for **IO** signifies a denial of all universality, whether that of **A** or that of **E**.

Lastly, what is the relation between **I** and **O** as such? They are obviously compatible, since they combine together within **IO**; that is, *they may both be true at once. But they cannot both be false at once*, for then their contradictories **A** and **E** would both be true, which is impossible. Their special opposition is therefore given a distinct name; they are said to be ***subcontrary***. Note that the concept of subcontrariety applies to a pair of propositions, while the larger concept of exhaustiveness (above defined) applies to any number of propositions.

> These concepts of opposition are applicable to other forms, besides those above, note. Also, there are other, related such concepts worth mentioning. Two propositions are ***mutual implicants***, if the truth of either implies the truth of the other and the falsehood of either implies the falsehood of the other. If, however, the implication is only one-way, they are said to be ***subalternatives***, and the one which implies but is not implied is called the ***subalternant***, while the one which is implied but does not imply is called the ***subaltern***. Two forms are said to be ***incompatible***, if they are contrary or contradictory; in all other cases, they are said to be ***compatible***. The latter class includes forms which are ***unconnected***, or neutrally related, meaning that they are related neither by mutual implication or subalternation, nor by contrariety or contradiction, nor by subcontrariety.
>
> It should be noted, too, that the same concepts of opposition can be applied to terms, as well as to propositions. Two terms, say X and Y, are mutual implicants, if all X are Y and all Y are X (in such case, X and Y are equivalent classes or coextensive). X subalternates Y, if all X are Y but not all Y are

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20 And indeed, 'call a spade a spade'.

21 The three laws: Identity, Non-contradiction, and Exclusion of a Middle, are known as the Laws of Thought. They were first formulated by Aristotle, who identified them as the foundations of all logic.

Y, in which case, Y is called a ***genus*** or overclass of X, and X is called a ***species*** or subclass of Y; *mutatis mutandis* for the reverse case, of X subalternated by Y[22]. X and Y are contradictory, if no X is Y, and no nonX is nonY. They are contrary, if no X is Y, but some nonX are nonY. They are subcontrary, if some X are Y, though no nonX is nonY. And, finally, they are unconnected, if all the categorical propositions relating them or their negations are contingent (note, however, that they may still have conditional connections in such case).

There are of course many other forms, besides those listed above. Propositions may also be ***singular*** (these involve an indicated instance of the subject "This X" or a proper name; symbols **R** and **G** are used for the positive and negative variants, respectively). All propositions other than singular are called ***plural***; this class includes not only **A**, **E**, **I**, **O,** but also *majoritive* or *minoritive* forms (those are introduced by the quantifiers "most" and "few", respectively) and with indeed any number or proportion we please ("lots of", "a few", "17", "two thirds of", etc.)[23]. Propositions may involve relations other than the copula "is" or its negation - for instances, "becomes" or "is-greater-than". Also, propositions are not all categorical in form, as above, but may be more complex constructs, such as the forms of *conditioning*. As well, all propositions are implicitly or explicitly qualified by *modality.*

By **modality** is meant the attributes of relations we signify by using words like: *necessarily, possibly, actually, actually-not, possibly-not, impossibly*. These *categories* of modality, as they are called, are collectively of many *types* (or *modes*); and ordinary language reflects this variety in meaning somewhat. They may have a ***logical*** sense (referring to the various contexts of our knowledge), a ***natural*** sense (referring to causal relations within/among things themselves), a ***temporal*** sense (referring to the times of the existence of a thing), an ***extensional*** sense (referring to the cases of classes of things), or even an ***ethical*** sense (referring to the available standards of value).

Thus, for instances, the logically necessary is what is true in all knowledge contexts, and the logically possible (or conceivable) is something true in some knowledge contexts; in contrast, the naturally necessary is what occurs in all circumstances, and the naturally possible (or potential) is something occurring in some circumstances; and so forth. Modal considerations inevitably emerge in all human knowledge, as expressions of its limitations (logical mode), and in the external world itself, as expressions of its diversity (extensional mode) and change (natural and temporal modes). The study of modality is a vast and fundamental domain, which has important repercussions in every issue of concern to logic and epistemology.

Note that though all propositions have underlying modal attributes, these modalities are not always explicitly stated, nor are they automatically known. The wording is in practice pretty mixed up, but to develop the theory of modality, some expressions may be reserved for one or the other mode - e.g.: must, can, cannot, for natural relations; always, sometimes, never, for temporals; all, some, none, for extensionals; should, may, mustn't, for ethicals.

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[22] *Note well* here that the subclass implies the overclass, and not vice-versa; so that the subclass is the subalternant and the overclass is the subaltern. The concept of subalternation is not to be confused, as is easily done, with the concept of subordination. While the species *implies* the genus (because whatever falls under the species is subsumed under the genus), the genus is said to *include* the species (because species is narrower than genus). To indicate the inferiority, in the latter sense, of the species to the genus, one may say that it is ***subordinate***. Thus, to repeat, a subclass is not subaltern to an overclass, but subordinate to it.

[23] It should be clear that plural propositions are here understood as statistical summaries of independent singular propositions. That is, "All/Some S are/aren't P" is equivalent to "This S is/isn't P" and "That S is/isn't P" and..., etc. (which, however, need not all be true at once). Such quantifiers are characterized as *dispensive* (or distributive), and are distinguished from *collective* reference (e.g. "All S, taken together, are P") and *collectional* reference (e.g. "All S, separately but simultaneously, are P").

The building block of **conditional propositions** is the relation of **conjunction** (signaled by use of the word "and") and its negation; from the latter we derive the various types of **implication** (usually signaled by "if-then-") and **disjunction** (signaled by the relation "-or-"), and their respective negations. The formal study of this field is reported to date from at least the 3rd century BCE in ancient Greece (notably, with Philo the Megarian). We cannot here cover this wide field; only a few remarks concerning it will be made.

With regard to the relation of implication. The expression "P implies Q", where P and Q refer to any two propositions, signifies that *"P" and "not-Q" cannot be true both together* (in the same body of knowledge, or with reference to the same instances of some concept, or in the same natural circumstances or times). This means that P is *incompatible* with the negation of Q; and it can be stated in the ***hypothetical*** form "if P is true, then Q is true", or more briefly as "**if** P, **then** Q". Here, P and Q are called ***theses***, P being the ***antecedent*** and Q being the ***consequent***.

The contradictory of such a proposition has the form "P does not imply Q" or "**if** P, **not-then** Q", which is defined by the statement that *"P" and "not-Q" can be true both together*, i.e. they are *compatible*. Note that both these propositions can be freely contraposed; that is, "if P, then Q" implies "if not-Q, then not-P", and likewise "if P, not-then Q" implies "if not-Q, not-then not-P"; this is easy to prove, merely by comparing the definitions of the original propositions and their contraposites (which state the incompatibility or compatibility, respectively, of "not-Q" and "not-not-P").

With regard to disjunctive propositions, they have the form "P **or** Q **or** R or...", in which P, Q, R, etc. are two or more ***alternatives*** (or *disjuncts*). Considering the simplest case, with two theses; we should note the distinction between *inclusive* disjunction ("P **and/or** Q", equivalent to "if not-P, then Q") and *exclusive* disjunction ("P **or else** Q", equivalent to "if P, then not-Q"). In the former case, the two theses cannot be both false, but may eventually be both true; in the latter case, they cannot be both true, but may eventually be both false; if the disjunction is both inclusive and exclusive, the theses are in contradiction (and we tend to use the form "**either** P **or** Q"). Generally speaking, disjunctions can be defined precisely by stating explicitly *how many* of the available alternatives may or must be true and *how many* of them may or must be false.

The study of propositional forms is merely a preparatory to the study of the *logical processes* involving them, which we shall now consider.

> All such processes, taken together, are widely referred to as *the scientific method*, but the word "science" in this expression must of course be understood as referring to knowledge as distinct from pseudo-knowledge or ignorance; and not to any professional body with privileged claims to truth. It should be clear that ***all inductive and deductive processes are commonly used by everyone, not just people involved in scientific enterprises***. The scientist is, if at all distinguishable from others, distinguishable by his attitudes, as someone who (ideally) makes just a little more effort to be careful with his methodology - to be ***open-minded and objective, clear and precise in language, and strict and perceptive in logic***.

b. Inductive logic[24].

How do propositions, such as those described above, come to be known? This is the question inductive logic tries to answer. The way we commonly acquire knowledge of nature, as ordinary individuals or as scientists, is by a gradual progression, involving both ***experience*** or ***perception***, whether of external phenomena (through the sense organs somehow) or of mental phenomena (with what we often call the "mind's eye", whatever that is), and ***reason*** or ***conceptual insight*** (which determines our evaluation and ordering of experience).

At the simplest level, we **observe phenomena**, and take note, say, that: "there are Xs which are Y" (which means, "some X are Y" = **I**), *leaving open at first* the issue of whether these X are representative of all X (so that **A** is true), or just special cases (so that **IO** is true). The particular form **I** is needed by us as a temporary station, to allow us to express where we stand empirically thus far, without having to be more definite than we can truthfully be, without being forced to rush to judgment.

If after thorough examination of the phenomena at hand, a continued scanning of our environment or the performance of appropriate experiments, we *do not find* "Xs which are not Y", we take a leap and presume that "all X are Y" (**A**). This is a **generalization**, an inductive act which upgrades an indefinite particular **I** to a universal of the same polarity **A**, ***until if ever evidence is found to the contrary.*** The *justification* of such a leap is that **A** is *more uniform* with **I** than **O**, and therefore involves less assumption: given **I**, a move to **A** requires no change of polarity, unlike a move to **O**, whereas with regard to quantity, the degree of assumption is the same either way.

If, however, we *do* find "Xs which are not Y" (i.e. that "some X are not Y" = **O**), we simply conclude with a definite contingent **IO**. If the discovery of **O** preceded any assumption of **A**, so well and good, the induction of **IO** proceeded in an orderly fashion. If on the other hand, we had assumed **A**, and then discover **O**, an *inconsistency* has effectively occurred in our belief system, and we are forced to reverse a previously adopted position and effect a **particularization** of **A** back to **I**, to inductively conclude **IO**. Needless to say - and we need not keep pointing out such parallels between positive and negative polarities - the sequence of such harmonization might equally have been **O** followed by **E**, and then **I** followed by **IO**.

Note that the particulars involved, **I** or **O**, may be arrived at directly, by observation, as suggested above, or, in some cases, indirectly, by deduction from previously induced data. The inductive processes we have so far described, of observation followed by generalization and particularization, are only a beginning. Once a number of propositions have been developed in this way, they serve as premises in deductive operations, whose conclusions may in turn be subjected to deductive scrutiny and additional inductive advances and retreats.

But we are not limited to the pursuit of such "laws" of nature; we have a broader inductive method, known as the process of **adduction**[25].

This consists in ***postulating*** propositions which are not arrived at by mere generalization and particularization, but involve *novel terms*. These novel terms are *put*

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[24] Inductive logic is also (though rarely) known as *epagogic*; in which case the term 'logic' is limited (as is often the case in common discourse) to deductive logic.

[25] This is also called the hypothetico-deductive method or the scientific method.

forward by the creative faculty, as tentative constructs (built out of more easily accessible concepts[26]) which might conceivably serve to explain the generalities and particularities (the "laws") developed more directly out of empirical evidence, and hopefully to make logical ***predictions*** and point the way to yet other empirical phenomena. The imagination, here, is not however given free rein; it is disciplined by the logical connections its postulates must have with already available data and with data which might eventually arise.

Scientific ***theories*** (complexes of postulates and predictions) differ from wild *speculations* in that (or to the extent that) they are grounded in experience through rational processes. They must deductively encompass accepted laws, and they stand only so long as they retain such a dominant position in relation to newly discovered phenomena. If logical predictions are made which turn out to be empirically true, the postulates are regarded as further ***confirmed*** - that is, their own probability of being true is increased. If however any logical predictions are found to be clearly belied by observation, the postulates lose all credibility and must be ***rejected***, or at least somehow modified. Theories always remain subject to such empirical ***testing***, however often confirmed.

Thus, knowledge of nature proceeds by examining existing data, making intelligent hypotheses as to what might underlie the given phenomena, showing that the phenomena at hand are indeed deductively implied by the suggested postulates, and testing our assumptions with reference to further empirical investigations. However, there is one more component to the scientific method, which is often ignored. It is not enough to adduce evidence in support of our pet theory; and the fact that we have not yet found any grounds for rejecting it does not suffice to maintain it....

We must also consider *all conceivable alternative theories*, and if we cannot find grounds for their rejection, we should at least show that our preferred theory has the most credibility. *This comparative and critical process is as important as the constructive aspect of adduction.* To the extent that there are possible challenges to our chosen theory, it is ***undermined*** - that is, its probability of being true is decreased. Evidence adduced in favor of one set of postulates may thus constitute counter-evidence adduced against other hypotheses. We may regard a thesis as inductively "***proved***", only if we have managed to eliminate all its conceivable competitors one by one. Very rarely - though it happens - does a theory at the outset appear unchallenged, the exclusive explanation of available information, and so immediately "proved". Also note, at the opposite extreme, we are sometimes stumped, unable to suggest any explanation whatsoever.

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26 A good example of this, is the Newtonian concept of 'force'. At the root of this scientific concept are the notions obtained through our intimate experience of push and pull, speeding and slowing. These intuitions give meaning to the idea of invisible attractions and repulsions between physical bodies, which cause them to accelerate or decelerate as they visibly do. The invisible factor of force is then quantified with reference to measurable changes of velocity. (Positivistic philosophy regards the invisible factor as superfluous; but it is convenient and we do use it, and furthermore, positivism itself makes use of such abstracts.) The 'novel terms' used in adduction are always based on notions recycled from experience, through the imagination, by analogy, into a new context. What gives the process scientific legitimacy is the check-and-balance provided by adduction.

c. Deductive logic.

Now, two kinds of deduction are possible from the *categorical* propositions we considered earlier: eduction and syllogism. **Eduction** (or immediate inference) consists in drawing out from a single given proposition, some implicit information concerning the same terms. **Syllogism** (or mediate inference) consists in drawing out from two given propositions which have a term in common, some implicit information concerning the other two terms involved. We call a given proposition, a ***premise***, and an inferred one, a ***conclusion***; and all these propositions considered together are said to constitute an ***argument***. We need not here go into a systematic and exhaustive listing and analysis of these processes.

An eductive conclusion merely changes the polarity of one or both terms in the premise and/or their positions; the polarity of the copula may change or remain the same, as appropriate. In all, there are seven processes; the primary two are obversion and conversion, all other kinds being reducible to combinations of them. Though the various processes are always applicable to the general forms; they are often inapplicable to one or both of the particular forms. Note well that not all the processes are reversible; in some cases, though the premise implies the conclusion, the conclusion does not imply the premise. An example of eduction is: "All Kohens are Levites; *therefore,* all non-Levites are non-Kohens" (this is contraposition of an **A** form, as defined below). In the following definitions, "S" and "P" symbolize the initial subject and predicate, and "-" a positive or negative copula:

1. ***Obversion*** merely changes the polarity of the predicate, moving from S-P to S-nonP. **A**, **E**, **I**, **O** become **E**, **A**, **O**, **I**, respectively (all reversibly). The *validity* of obversion proceeds from the laws of thought: "S is P" and "S is not nonP" are equivalent, because P and nonP are mutually exclusive and together exhaustive alternatives; the quantity remains unaffected by it, because plural propositions are just sets of singulars.
2. ***Conversion*** merely transposes the subject and predicate, moving from S-P to P-S. **A**, **I** both become **I** (only the latter reversibly)**; E** becomes **E** (reversibly); but **O** is not convertible. The *validity* of conversion, in the case of **I**, proceeds from the equivalence of the conjunctives "Some things are S and P" and "Some things are P and S", which are respectively identical with "Some S are P" and "Some P are S". **A** is convertible by virtue of its implication of **I**; it is not, however, fully convertible, note well. **E** is convertible, because it contradicts **I**.
3. ***Obverted conversion*** is achieved, where possible, by converting then obverting, moving from S-P to P-nonS. **A**, **I** both become **O** (only the latter reversibly)**; E** becomes **A** (reversibly); but the process is inapplicable to **O**.
4. ***Conversion by negation*** is achieved, where possible, by obverting, then converting, from S-P to nonP-S. **A** becomes **E** (reversibly); **E, O** both become **I** (only the latter reversibly); but the process is inapplicable to **I**.
5. ***Contraposition*** is achieved, where possible, by obverting, then converting, then obverting, moving from S-P to nonP-nonS. **A** becomes **A** (reversibly); **E**, **O**, both become **O** (only the latter reversibly); whereas **I** is not contraposable. (Note well that **E** is *not* contraposable to **E**.)

6. ***Inversion*** is movement from S-P to nonS-nonP. This is achieved (irreversibly, note): for **A**, by contraposing, then converting, to obtain **I**; for **E**, by converting, then contraposing, to obtain **O**; whereas the particulars **I**, **O** are not invertible.
7. ***Obverted inversion*** is achieved (irreversibly, note), where possible, by inverting, then obverting, moving from S-P to nonS-P. **A** becomes **O**; **E** becomes **I**; while the process is inapplicable to the particulars, **I** and **O**.

Syllogistic arguments are distinguished by the interplay of their figures and moods. The ***figure*** of a syllogism is the way its three terms are arranged in the two premises and the conclusion. The ***mood*** of a syllogism is an expression of the quantity and polarity of its three propositions. A specific figure/mood of syllogism is said to be ***valid*** if its premises, whether they are materially true or false, together formally *imply* its conclusion; otherwise it is ***invalid***, even if the premises and conclusion happen to be true. The issue of validity is primarily an issue of dependence, not of truth, note well.

The premises are named the ***minor*** premise and the ***major*** premise. The term found in both premises is known as the ***middle*** term (we will symbolize it by a Y) - this term is absent in the conclusion; the remaining terms are known as the ***minor*** term (symbol, X) and ***major*** term (symbol, Z), like their corresponding premises - these terms reappear in the conclusion, as its subject and predicate respectively. Traditionally, a mood is identified by explicitly listing its major premise, its minor premise, and its conclusion, in that specific order; although in practical discourse they may appear in any order, and sometimes one or two of them may be left tacit. As shown below, there are four conceivable figures of syllogism:

Figures	**First**	**Second**	**Third**	**Fourth**
Major premise	Y-Z	Z-Y	Y-Z	Z-Y
Minor premise	X-Y	X-Y	Y-X	Y-X
Conclusion	X-Z	X-Z	X-Z	X-Z

Now, if we take as our propositional arsenal the forms **A**, **E**, **I**, **O**, which we defined earlier, and we examine all their combinations closely (a simple calculation shows that there are 4^3=64 conceivable moods in each figure), we find that only 23 syllogisms are logically valid (that is, a mere 9% of the total)! Of these, only 13 need concern us (the other 10 are of derivative importance); they are:

Figure one: **AAA**, **AII**, **EAE**, **EIO**.
Figure two: **AEE**, **AOO**, **EAE**, **EIO**.
Figure three: **AII**, **IAI**, **EIO**, **OAO**.
Figure four: **EIO**.

More explicitly, we have the following significant valid moods in the various figures. Notice the symmetries and asymmetries.

Figure One:

1/AAA:	**1/AII:**	**1/EAE:**	**1/EIO:**
All Y are Z	All Y are Z	No Y is Z	No Y is Z
All X are Y	Some X are Y	All X are Y	Some X are Y
∴ All X are Z	∴ Some X are Z	∴ No X is Z	∴ Some X are not Z

Figure Two:

2/AEE:	**2/AOO:**	**2/EAE:**	**2/EIO:**
All Z are Y	All Z are Y	No Z is Y	No Z is Y
No X is Y	Some X are not Y	All X are Y	Some X are Y
∴ No X is Z	∴ Some X are not Z	∴ No X is Z	∴ Some X are not Z

Figure Three:

3/AII:	**3/IAI:**	**3/EIO:**	**3/OAO**
All Y are Z	Some Y are Z	No Y is Z	Some Y are not Z
Some Y are X	All Y are X	Some Y are X	All Y are X
∴ Some X are Z	∴ Some X are Z	∴ Some X are not Z	∴ Some X are not Z

Figure Four:

4/EIO:
No Z is Y
Some Y are X
∴ Some X are not Z

The mood **1/AAA** (nicknamed *Barbara*), is in fact the prototype of all syllogism, and may be regarded as intuitively obvious; all others can be *reduced* to it, directly or indirectly. We may use eductive processes and transpositions of premises for purposes of validation; and we may also use a method called **reduction *ad absurdum***. For instance, to validate the argument "if no Z is Y and some X are Y, then some X are not Z" (**2/EIO**), we would say "for if all X were Z, then no X would be Y".

Here is an example of syllogism (mood **1/AAA**, in which the middle term is, as it happens, a compound predicate): "All fishes with fins and scales are kosher; sardines are fishes with fins and scales; *therefore*, sardines are kosher".

A few words on the **logic of change** are necessary, here, as we shall have occasion to refer to this field in a later chapter. Change has two forms 'getting to be' and 'becoming'; propositions involving

these relations are known as ***transitive*** categoricals, in contrast to *attributive* categoricals, which involve the copula 'is'. While 'X is Y' refers to a static relation between the terms, 'X changes to Y' refers to a dynamic relation such that something X was previously not Y, and later Y. In 'X gets to be Y', what is 'X and not Y' initially, is 'Y and *still or again* X' finally; whereas in 'X becomes Y', what is 'X and not Y' initially, is 'Y and *no longer* X' finally. Thus, the former concerns superficial change (the thing remains X when it appears as Y), the latter fundamental change (or metamorphosis, the thing ceases to be X before it reappears as Y). The distinction is most evident in the limiting case: while X *cannot* be or get to be nonX, it *can* become nonX; note this well.

The concept of change and the distinction between superficial and fundamental change are of great significance to syllogistic logic. For instance, with reference to natural modality, the premises 'All Y must be Z, and X can be Y' yield a valid conclusion 'X can be Z' (in the first figure, with necessary major premise and potential minor premise, the conclusion is potential). However, the premises 'All Y can be Z, and X can/must be Y' do *not* similarly yield the conclusion 'X can *be* Z', as we might at first sight imagine, but 'X can get to be *or become* Z'; in the case of a potential major premise (first figure), the valid conclusion is still potential, but it is not a single categorical, it is a choice of two categoricals! For here, the given premises, though they affirm the minor and major terms separately, do not guarantee them capable of coexistence: it is conceivable, and it happens, that they are incompatible.

We see from this pivotal case that the relations of being and becoming are formally interlaced in the theory of syllogism (the role played by modality in this is secondary: it merely abstracts the temporal element). Many other syllogisms of the same kind are valid, notably 'All Y can become Z, and X can/must be Y; therefore, X can get to be or become Z', or 'All Y must become Z, and X can be Y; therefore, X can get to be or become Z', or 'All Y must become Z, and X must be Y; therefore, X must get to be or become Z'. (Note that 'get to be' may replace 'be' in such arguments, since the former logically implies the latter.) We need not go further into this field for our purposes here.

With regard to *conditional* propositions, various deductive processes have also been identified. We shall here briefly focus only on logical conditioning, and mainly on propositions of specifically hypothetical form, like "if P, then Q" or "if P, not-then Q".

We have, to begin with, eductions, the most notable of which are conversion (shown below) and contraposition (shown earlier, when the forms were first defined):

"If P, then Q" (=P and not-Q impossible) is normally convertible to "If Q, not-then not-P" (=Q and not-not-P possible), for if Q implied not-P, then P would be self-contradictory.

"If P, not-then not-Q" (=P and not-not-Q possible) is convertible to "If Q, not-then not-P" (=Q and not-not-P possible), for if Q implied not-P, then P would imply not-Q, contradicting the premise.

We also have syllogistic arguments, very similar to those encountered previously; some important examples:

1st Figure:	*2nd Figure:*	*3rd Figure:*
If Q, then R,	If Q, then R,	If R, not-then not-Q,
if P, then Q,	if P, then not-R,	if R, then P,
so, if P, then R.	so, if P, then not-Q.	so, if P, not-then not-Q.

If Q, then R,	If Q, then R,	If R, then Q,
if P, not-then not-Q,	if P, not-then R,	if R, not-then not-P,
so, if P, not-then not-R.	so, if P, not-then Q.	so, if P, not-then not-Q.

All such arguments can normally be validated with reference to the first of them here listed, by direct or indirect reduction. Note that the first two examples here given, involving only positive hypotheticals, may be referred to as *uppercase* syllogisms, whereas the others, involving negative hypotheticals, may be referred to as *lowercase* moods; because, effectively, positive hypotheticals are analogous to general categoricals, while negative hypotheticals have properties similar to particulars.

Another important kind of deduction is **apodosis**, which has two essential moods, one positive, one negative[27]:

Modus Ponens:	*Modus Tollens:*
If P, then Q,	If P, then Q,
and P,	but not-Q,
whence, Q.	whence, not-P.

Hypothetical propositions can often be derived from non-hypothetical propositions by a process called **production**. All the results of formal logic can be viewed as productive in this sense. For example, the premises “All Y are Z and some X are Y,” within the primary, Aristotelian perspective, yield the categorical conclusion “some X are Z”. However, one can also draw a secondary conclusion of extensional conditional form, “if any X is Y, it is Z”; or again tertiary conclusions of logical conditional form, like “if all Y are Z and some X are Y, then some X are Z”.

In dealing with logical conditioning, it is important to distinguish normal and paradoxical forms. Some arguments involving hypothetical propositions are valid independently of this issue, while others are only valid specifically in cases where neither thesis is internally inconsistent. We cannot go into this matter in detail here, only briefly touch upon it....

In its broadest sense, the form “if P, then Q” allows for **paradox**: if we substitute “not-P” for “Q” we obtain the proposition “if P, then not-P”. This proposition is formally possible, since it merely tells us, according to our original definition, that “P and not-not-P cannot be true” - and from it we can infer that P cannot be true. Note well that the hypothetical “if P then not-P” is not itself faulty, but clearly reveals to us the *logical impossibility* of the antecedent P, and therefore incidentally the *logical necessity* of the consequent not-P. We say, therefore, that “if P, then not-P” is a paradoxical proposition or argument, yielding that P is ***self-***

[27] Note that the valid moods of apodosis consist in 'affirming the antecedent' or 'denying the consequent'. To 'affirm the consequent' or 'deny the antecedent' is invalid from a deductive point of view; but note that such reasoning has inductive value, respectively 'confirming the antecedent' or 'weakening the consequent' (see comments on adduction in the next chapter).

contradictory and not-P is ***self-evident***. Needless to say, the form "if not-P, then P" would have the opposite result (namely, P).

Paradoxical argument is seldom encountered in practice; but when it is feasible, it usually justifies some fundamental pillar of human knowledge. An example: If we assert that "humans cannot know anything for sure", we are effectively claiming certain knowledge for ourselves in that case at least; our explicit assertion is therefore implicitly self-contradictory and false; it follows that "humans can know some things for sure" is true and self-evident. Note that 'self-evident' means immediately evident or obvious, independently of any knowledge context, and therefore evident in all knowledge contexts; this may be contrasted to '*contextually* evident', which refers to what seems evident in some contexts, but might eventually not be so in others.

Such inference may also, more commonly, occur indirectly, in the process known as **simple dilemma**. This kind of argument was historically one of the first noticed by the Greeks[28]. Two moods have been identified:

Constructive mood:	*Destructive mood:*
If P then R and if Q then R,	If R then P and if R then Q,
but P or Q (or both);	but not-P or not-Q (or both);
therefore, R.	therefore, not-R.

Here again, a relatively categorical conclusion is drawn from conditional premises[29]. A similar kind of inference, also with two moods, which however yield only disjunctive conclusions, is **complex dilemma**:

Constructive mood:	*Destructive mood:*
If P then R and if Q then S,	If R then P and if S then Q,
but P or Q (or both);	but not-P or not-Q (or both);
hence, R or S (or both).	hence, not-R or not-S (or both).

Much more can of course be written about all the forms and processes mentioned above[30], and others still. The science of logic, as above briefly presented, dissects our thinking

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28 Sophists, if I remember rightly; long before Aristotle, anyway. A Biblical example of such arguments is 2 Kings 7:4, which goes roughly like this: if we enter the city, we die; if we stay at the gate, we also die; but if we go to the enemy's camp, we might be spared. This may be viewed as partly a dilemmatic argument (whether we enter city or stay at gate, we die), but more broadly as a disjunctive argument (listing three alternatives, eliminating two, leaving one).

29 With appropriate substitutions, it is easy to show that paradox is a special case of simple dilemma. Put "not-P" instead of "Q" and "P" instead of "R"; the constructive mood involving "if not-P, then P" yields P, and the destructive mood involving "if P, then not-P" yields not-P.

30 We may, for instance, note the formal continuity between apodosis and dilemma. Simple dilemma uses a vaguer premise than apodosis (disjunctive, instead of categorical) to yield an as definite conclusion (categorical), while in complex dilemma the conclusion is vaguer (disjunctive).

processes into small units, studying each one carefully. In practice, these formal units are combined together and permuted in every possible way, usually with many intermediate steps left unuttered (whether out of dishonesty, ignorance, laziness or merely to avoid saying the obvious). The person who studies logic becomes adept at analyzing any reasoning he/she encounters with reference to its formalities, and is thus able to evaluate it accurately.

I refer readers open to further study of formal logic to text-books found in the market, and especially to my own work ***Future Logic***. In the present volume, however, we must move on to more specific concerns.

2. ADDUCTIVE LOGIC IN THE *TORAH*.

This chapter is intended mainly for historians of logic, or historians of philosophy, though it includes a brief overview of epistemology of value to all, and some interesting comments on prophecy.

1. The Art of Knowing.

I*nduction*, as an epistemological concept, refers to the logical processes through which all propositions, and their various constituents, are gradually developed. Some philosophers have tended to define induction as the pursuit of general principles from particular ones, but such a formula is too limited and only reflects the greater difficulty of and interest in that specific issue. In the largest sense, induction includes all the following factors of cognition:

- **perception** (direct consciousness of concrete phenomena, whether material/sensory or mental/intimate) and **conception** (direct consciousness of abstract phenomena[31] or indirect consciousness of anything), as well as **recognition** (memory of percepts and concepts) and **imagination** (perceptual or conceptual projection);

- **identification** (awareness of similarities between phenomena) and **differentiation** (awareness of differences between phenomena), which make possible **classification** (grouping), often accompanied by **verbalization** (naming);

- **formulating propositions**, with varying degrees of awareness, sometimes but not always verbally, which relate together various percepts and concepts in various ways (first as possible potential particulars);

- **generalization** and **particularization** (including the techniques of *factorization, factor selection*, and *formula revision* - see my work *Future Logic* for details), which are the processes through which one discovers how far one may extend or one must narrow the applicability of propositions;

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[31] The process of **abstraction** consists in ignoring (excluding from consciousness) all but certain aspects of something perceived in whatever way; this process precedes the comparisons, contrasts and mental manipulations through which we conceptualize.

- **deduction**, the inference of some new proposition(s) from one or more given proposition(s) of any kind, through a host of processes like *opposition*, *eduction*, *syllogism*, *a-fortiori*, *apodosis*, *paradox*, and others;

- **adduction**, the formation and tailoring of postulates, as well as their *testing* and *confirmation* or *elimination*, with reference to rational-empirical considerations (more on this topic below).

All the above depend on reference to the main Laws of Logic, which ensure the ultimate fullness and harmony of knowledge, namely:

1. **Identity** - acknowledging all phenomena cognized, as being at least appearances, and so problemacies with varying credibilities, whether ultimately found to be realities or illusions; *never ignoring data or issues*. (This is what we mean by "facts are facts".)
2. **Non-Contradiction** - not acknowledging as real, but insisting as partly or wholly illusory, any set of propositions cognized as incompatible, whatever their levels of abstraction and cognitive roots; *always pursuing consistency in one's knowledge*. (Contradictions are impossible in reality.)
3. **Exclusion of the Middle** - not rejecting all possible alternatives, but seeking resolution of conflicts, through some new alternative or some commonalty; *seeking solutions to all problems*. (There is no nebulous middle ground between being and not-being.)

Now, these various factors of cognition play a joint role in the acquisition of knowledge, and although here listed in a 'logical' manner, with some subdivisions and in a semblance of chronological order, they in actual practice function very interdependently, feeding off each other's results in every which way and in no set order. Furthermore, they are here described very succinctly, so much so that their individual, relative and collective significances may be missed if one does not take time to reflect.

This brief overview of the theory of knowledge should be understood as *both descriptive and prescriptive*. That is to say, there is no essential difference between the palette of cognitive processes used by different human beings, be they common folk or expert scientists, trained in logic or purely instinctive, male or female, young or old, of whatever class or people, healthy or sick. This must be stressed: everyone has more or less the same cognitive tools; some people are, there is no denying it, better endowed, others somewhat handicapped, but their overall arsenal is roughly the same, as above listed.

What distinguishes individuals is perhaps rather the effort and skill they exercise with these same instruments, in each given context. Knowing is an art, and artists may vary in style and quality. Some people lay more stress on experience, others on reasoning, others on their emotions. Some people are more visual, some more auditory, some more touch-sensitive. Some people are excessively categorical or class-conscious, too verbal in their thinking, to the detriment of intuition; some people are slaves to their passions, exercising insufficient control on the objective quality of their thought processes. And so forth - but in any case, the range of

faculties available to human beings is roughly the same. The art, as with music, as with painting, is to find a balance - the right measure, the right time and place, for each instrument.

It must be added that two people equally skilled in the art of knowing (or one person at different times) may arrive at different specific conclusions, due to different ***contexts*** of knowledge. The content and volume of one's experience - in the largest sense of the term experience, including material and mental perceptions and conceptual insights - has a direct influence on one's logic, affecting one's every rational process.

2. Adduction in Western Philosophy.

Logic, since Antiquity and throughout the Middle Ages, in Europe at least, has been associated more specifically with deduction, because that was the field in which the most impressive theoretical work had been done, mainly by Aristotle. Only in recent centuries was a greater stress laid, thanks in large part to practitioners like Newton, on the experiential aspects of knowing (by philosophers like Locke and Hume) and on its adductive aspects (by philosophers like Bacon and Mill); and in more recent times on the crucial role of imagination in theory formation (by Einstein, for instance).

This does not mean to say that induction, nor more specifically adduction, are novel concepts as such. People certainly always used all the factors of induction in their everyday efforts at knowing - they used their senses and their heads, to try and make sense of the world around them, sometimes more wildly than we do, sometimes more rigidly, sometimes more sensibly perhaps. Also, we have to admit that Aristotle, after some four or five centuries of development in Greek philosophy including his predecessors Socrates and Plato, was well aware of the primary issue of induction, the so-called 'problem of universals' (namely, how concepts are known).

Indeed, his formal work in logic, including on opposition, on immediate inference and on the syllogism, was a lucid attempt, however incomplete, to solve just that problem. Deduction, in Aristotle's view, was not apart from induction, or against it, but rather a major aspect of induction. For him, it seems, certain generalities were known directly and indubitably (like the axioms of logic), others had to be developed empirically (seemingly, by complete enumeration); thereafter, one could arrive by inference to all other general principles. The grey areas in that view were, no doubt, the source and validity, and the number, of the initially given top principles, as well as the scope of empiricism in the light of the practical difficulties in complete enumeration.

Today, we would certainly agree that deduction is one of the instruments of induction - needed to infer predictions from postulates for testing purposes, and more broadly, to pursue consistency. The grounds of knowledge, in our view, are primarily experiential data, whether concrete or abstract, and to a lesser extent self-evident propositions whose contradictories are self-contradictory. We are more aware of the hypothetical and tentative nature of much of knowledge; and instead of complete enumeration, we refer to processes like generalization and particularization.

But if we regard the perceptual and conceptual phenomena which are the starting-points of knowledge as being effectively 'axioms' (in an enlarged sense of the term), then our

view is seen as not much different from Aristotle's in essence, though varying in detail and emphasis. The historical point I am trying to make is certainly not, that Aristotle was omniscient and as fully aware of epistemological questions and answers as we are today. Rather, that in his time and earlier still, a search for such questions and answers was already in motion, and a spirit of intelligence, honesty and objectivity was already at work, so that to make a fair assessment we must focus on his contributions instead of his blanks.

I think it is important for historians to keep in mind that philosophers are human. They do not have time to put everything they know or think into words, down on paper. Often, too, they intuit a larger horizon than they have the time to actually tread in detailed thought. No one philosopher can therefore be expected point out and clarify every aspect of induction, or to develop a truly full spectrum of logical techniques. Not saying something is not necessarily not knowing it, or at least being on the way to know it. Some unimaginative disciples, as well as historians, tend to ossify philosophies, and make them seem more rigid and limited than they were to their living wellsprings.

Thus, the suggestion that general propositions are arrived at by 'complete enumeration', attributed by some historians to Aristotle, contains within it the seeds of empiricism. We today certainly acknowledge the major role played by *partial* enumeration - this is how *particular* propositions are known: one experiences one or more cases of a kind to have a certain attribute or behavior, and one expresses that observation verbally, without thereby presuming to comment on the unobserved cases or to claim that they have the same attribute or behavior.

This is the common ground, between us and Aristotle; the issue is only, how one moves up from there to generalities. Complete enumeration may have been, for Western philosophy, a first and tentative suggestion; but upon reflection it was soon enough seen to be an impractical ideal, because most classes we deal with are open-ended. Today, we realize that the answer is to be found in the trial and error processes of generalization and particularization, or more broadly speaking in adduction.

Nevertheless, in spite of their manifest deep roots in the past, it is evident that until the Enlightenment the concept and laws of adduction were relatively little discussed and little understood, in Western philosophy at least. Historians tend to attribute to Francis Bacon (1561-1626, London) the clear formulation of these laws. As Anthony Quinton points out, the crucial innovation in Bacon's 'new method' was that it was *eliminative* ("*major est vis instantiae negativae*"). Bacon also gave due credit to the positive aspects of induction (i.e. observation and confirmation), and he made explicit many of the pitfalls possible in the course of such processes (which he referred to as "idols").

Needless to say, Bacon's words were not the last on the subject; many further contributions have happily been made since then. Whatever their precise history, the **Laws of Adduction** may be expressed as done below. By 'postulate' is meant a set of imagined propositions of yet unsettled truth. By 'experience' is meant any appearance, preferably concrete rather than abstract, taken *as is*, as it appears, as a mere configuration of phenomena, without classificatory work of comparison and contrast to other, remembered phenomena. By 'confirmation' or 'weakening' of a thesis is meant adding or subtracting some credibility from it; whereas by 'proof' or 'disproof' is meant extreme credibility or incredibility.

1. **If some postulate has certain necessary logical implications, and these implications are found to be in accord with experience, the postulate is thus far confirmed, though not necessarily proved** (Positive Law).

2. **If some postulate has certain necessary logical implications, and these implications are found to be in discord with experience, the postulate is disproved, and not merely weakened** (Negative Law).

These laws may be explained, and unified, with reference to the concept of probability, and on the same basis many corollaries can be derived from them. The corollaries emerge from the consideration of competing postulates - a couple of examples: every time a postulate is confirmed, while a competitor is not confirmed, then the latter is weakened; when a postulate is disproved, then all its remaining competitors (whether known or unknown alternatives) are strengthened (though all equally so, unless some of them predicted the disproving experience, rather than merely accepted it). However, these issues and details are too voluminous for the present study (see my work ***Future Logic***).

3. Adducing Prophecies and Prophethood.

Adduction is generally regarded as a historically relatively recent philosophical concept, and those who do so, whether out of traditionalist or modern tendencies, may therefore consider that its application to Biblical or Talmudic contexts is an anachronism. The truth of the matter, in my view and I will now demonstrate it, is exactly the opposite. The laws of adduction are found almost explicitly formulated already in the Torah of Moses, evidence of a very early logical maturity, and it is not surprising therefore that they should have been used with such frequency and skill in Talmudic times[32].

The essentials of adductive method are given in two passages of Deuteronomy. I will now quote them and explain the aspects of adduction that each clarifies (referring to the positive and negative laws written in the previous section). Note that the term 'prediction', used below, should be understood to comprise all descriptive details of the event(s) concerned, including eventual time limits and location.

FIRST LAW: **Deuteronomy 13: 2-4.**

> *If there arise in the midst of thee a prophet, or a dreamer of dreams - and he give thee a sign or wonder, and the sign or wonder* ***come to pass****, whereof he spoke unto thee - saying: 'Let us go after other gods, which thou hast not known, and let us serve them'; thou shalt not hearken unto the words of that prophet, or unto that*

[32] Notwithstanding, the Talmud, in its effort at creating dogmas, at least as we view it nowadays, preferred to keep these adductive processes relatively hidden and tacit, so as to give the impression, false but convenient, of being a purely *deductive* discipline - but that is another issue.

dreamer of dreams; for the Lord your God putteth you to proof, to know whether ye do love the Lord your God with all your heart and with all your soul.

SECOND LAW: **Deuteronomy 18:21-22.**

And if thou say in thy heart: 'How shall we know the word which the Lord hath not spoken?' When a prophet speaketh in the name of the Lord, if the thing ***follow not, nor come to pass****, that is the thing which the Lord hath not spoken; the prophet hath spoken it presumptuously, thou shalt not be afraid of him.*

Evidently, the first law deals with the positive aspect of adduction: it acknowledges the natural tendency of humankind to be moved to belief by correct prediction (the prophecied event empirically 'comes to pass', i.e. occurs), but it comes to teach us that such confirmation *does not constitute proof*, and therefore that good reason may yet be found to reject the thesis in question (such as its calling for a turn to other gods). The second law elucidates the negative aspect of adduction: it suggests that false theses ultimately stumble, teaching that incorrect prediction (the prophecied event empirically 'follows not, nor comes to pass', i.e. does not occur as and when predicted) is not merely a weakness but *constitutes disproof*, so that the thesis in question must be eliminated.

The logical value of these biblical statements, the legitimacy of their interpretation as here done as *general epistemological principles*, is (I think all will agree) manifest. Note well the **empiricist criteria** explicitly given here: the prediction 'comes to pass' or 'comes not to pass'; the thesis in question (the prophecy) is *tested empirically with reference to public events* and not solely by the (rationalistic) comparison to the religious document or tradition.

The following comments are incidental to this overriding issue, but while we are on the subject of prophecy they are worth making.

We have to note for the record that traditional commentators have, with reference to passages relating to prophecy found throughout the Tanakh, further refined the above rules, and thereby incidentally showed their full understanding of their implications. They pointed out that the two Deuteronomic rules were formulated with reference to false prophets. They are logical techniques for the identification and evaluation of candidates for the dignity of prophet, teaching us not to automatically believe those who claim to be mouthpieces for God and how to find out that they are not.

I was told by R. Abraham Y. Schlesinger of Geneva (but have not verified it) that the refinements under discussion are elucidated notably by Maimonides, in *Hilkhot Yesodei haTorah* 10:4; as for the Talmudic source, it is not the Babylonian but the Jerusalem Talmud, namely *Sanhedrin* 15:5, "*Ani mitnabei...*". However, I found the main Biblical source thanks to the Encyclopaedia Judaica article on prophets and prophecy: it is Jeremiah 28:8-9, which I now quote (Yirmeyahu is talking to Chananyah ben Azur, a rival prophet, who has promised good things for the Judeans):

The prophets that have been before me and before thee of old prophesied both against many countries, and against great kingdoms, of war, and of evil, and of

pestilence. As for the prophet who prophesies for peace, when the word of that prophet shall come to pass, then shall it be known that the Lord has truly sent the prophet.

This passage implies that if a prophet made a prediction which did not come to pass, it did not follow that he was not a true prophet. It depended on the polarity of the prophecy in question. If it constituted *a blessing* from God, then once announced it had to come to pass, because God's blessings are irrevocable. If what was predicted was *a curse*, it might well not come to pass and yet still be true, because such negative prophecies are always (i.e. up until they are realized) conditional and contingent on the eventual failure of the audience to repent and change their ways (as in the story of Jonah and Nineveh, for instance).

The proposal is consistent. We may just add that the same loophole, in fairness, equally well applies to prophetic candidates as to established prophets. In other words, negative predictions of theirs which do not come to pass, do not disqualify them, either; only positive predictions which do not come to pass, do. For an example in the Bible (other than the above mentioned by Chananyah) of false positive prediction, look at 1 Kings 22 (and 2 Chronicles 18), where some 400 'prophets' in the court of Achav (Ahab) promised him victory over the Arameans, while only Micah foresaw the death of the king of Samaria.

It should be noted that good and bad are often relative - what is good for one person or group may be bad for another, and vice versa, or even with regard to one and the same person something may be good in some respects or at some time and bad in/at others. Blessings are often 'mixed'. Assumably, the evaluation of a prediction as 'positive' or 'negative' is made with reference to the terms of the prophecy itself: whom it intends to favor or disfavor, how, and when.

With regard to prophecies of *neutral* events, like some astronomical events or perhaps some unnatural apparition in public, without good or bad impact on human lives, other than serving to reveal the predictive power of the prophet, (I assume that) they fall under the Deuteronomic rules quoted earlier. Which means, neutral events predicted by a reputable prophet are bound to come to pass; and, a prophetic candidate predicting neutral events which fail to occur is disqualified.

Note that the *Enc. Jud.* article mentioned above points out that, even with the refined rules proposed by Jeremiah, difficulties arise when prophecies accepted as true by tradition are tested with reference to later events as described in the Bible itself. However, such difficulties are generally surmountable, because one may always *ex post facto* interpret even 'failed' positive prophecies as having, as in the negative cases, been *tacitly conditional*[33]. One can say

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[33] That this is an accepted and used manner of reasoning by traditional commentators may be demonstrated with reference to a difficulty in Gen. 28, pointed out by R. Adin Steinsalz in a talk in Geneva recently. During Jacob's dream of the ladder, God promises him many good things (v. 13-15), yet immediately thereafter Jacob seems to doubt these promises, when he says "*If* God will be with me..." (v. 20-22). The explanation Rashi gives (according to R. Steinsalz, but I did not find the place) is that Jacob understood God's promises as depending on his continued good conduct, i.e. on his remaining the same person. Thus, here a positive promise is taken as *tacitly conditional*.

Incidentally, R. Steinsalz himself offered an alternative explanation of Jacob's doubt: namely, that Jacob may not have been sure whether his dream was indeed a prophecy or merely the wishful thinking of a worried traveler. But, though this explanation is psychologically interesting, epistemologically it implies that a prophet can doubt his own prophecy. Such a premise would, in my view, put all prophecies in doubt; we must assume that the prophetic experience is intrinsically indubitable, or else it loses its special status.

that the good things were promised to happen, *provided* we stayed on our positive path or improved our ways in certain obvious ways, just as one can say that the bad things were promised to happen, *unless* we got off our negative path and improved our ways.

One more comment which may be profitably made in this context, with regard to prophecies, whether in the Bible or in the analogous documents of other religions or sects, is that they are very often *sufficiently vague*, with regard to time and place, if not with regard to descriptive details, that they can be evaluated rather generously by those who already believe in them and additionally be twisted by interpretation to fit any scenario they wish. Prophecies are not always conveniently vague, of course; for instance, in Jer. 28, Chananyah sets a two year time limit for his prophecy and Yirmeyahu, a clear one year for his.

Some of these comments no doubt sound very skeptical, but one must be honest and see: just what is being prophecied, in relation to whom exactly, and precisely when and where. Without these specifications it is very hard to apply the adductive laws in a strict and conclusive manner. The real difficulty is to know where to draw the line, between justification and pretext; for this we must refer to *context*: the past reputation of the prophet, the turn of subsequent events, and the overall theme of the Bible. (I do not here even consider the issue of historicity, whether the events reported actually occurred; this too calls for context, but still wider a context than that provided by the text itself.)

It is necessary to distinguish between the adductive evaluation of prophecies and that of prophets. A prophet, one might say, is a bundle of prophecies. First, each prediction must be evaluated, using the given principles; second, the person making the predictions is evaluated, with reference to his/her overall record of predictions. This distinction is made clear through the story of Bilaam, a false prophet who was nonetheless used, even against his own will, by God as the vehicle of true prophecies which predicted the blessings of Israel (Num. 22-24)[34].

Another issue is to distinguish between claims to prophecy, and ordinary predictions. Even if we regard (as I do, with gratitude) every item of knowledge, however ordinary its methodology, however natural its source, as a wondrous gift from God - a distinction must be drawn. The medieval commentator Nachmanides interprets terms in the above quoted passages as follows: ‘a prophet’ - one who claims that God communicated a message to him while he was awake[35]; ‘sign’ denotes the prediction of a natural incident, while ‘wonder’ implies the forecast of a supernatural event[36]. A meteorologist, say, makes no claims to prophecy, yet forecasts the weather; we would judge him as an effective scientist is his predictions were consistently (or even usually) right, but never assign him prophetic powers.

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34 This story is full of interesting details about prophecy. According to Nachmanides (Cohen, p. 921), that Bilaam was not a prophet beyond the events recounted in it is suggested by the use of the expressions "God came unto Bilaam" (22:9) and God or the Lord "met Bilaam" (23: 4, 16), which suggest a non-habitual encounter *(yikar)* initiated by God (*yavo*). Furthermore, the expression "the Lord put a word in Bilaam's mouth" (23: 5, 16) seems to imply a forcible takeover by the Lord of Bilaam's faculties of speech, at least in the first two prophecies; in the third prophecy "the spirit of God came upon him" (24:2). Other technical details include: having the eye opened (24: 3, 15), hearing the words of God, seeing the vision of the Almighty, fallen down yet with opened eyes (24: 4, 16), and knowing the knowledge of the Most High (24:16).

35 But see Num. 12:6-8, where a ‘prophet’ is defined as someone to whom the Lord makes Himself known in a ‘vision’ or speaks to in a ‘dream’, with the exception of Moses who is spoken to ‘mouth to mouth, even manifestly, and not in dark speeches’ and who beholds ‘the similitude of the Lord’ (Cohen, p. 855).

36 Cohen, p. 1062.

What counts in the judgment concerning prophecy is the source of the knowledge, or the methodology which led to it. If natural means are used, like satellites, even daily and invariably correct predictions do not imply 'prophecy'. This is equally true in the case of predictions so vague that there is a natural probability that such and such a kind of event happen at some time in the future somewhere in the world! Of course, the wild guesses of charlatans, however convinced they themselves might be of the unnatural origins of their predictions, are bound to turn out wrong sooner or later, and reveal the fakeness of their authors. Prophecy, then, has to predict ***natural events unpredictable by ordinary means*** or to predict ***supernatural events*** (which are, in any case, unpredictable by ordinary means).

The concept of an 'unnatural' event presents logical difficulties, by the way. The perfectly scientific mind has no preconceptions, no foreknowledge, regarding Nature or what is natural; whatever happens, whatever happens to happen, *is* natural, and Nature *is* the sum total of all things ever happening. Just because an event is unique, different from routine events, it does not follow that it is unnatural, just less frequent. The definition of magic or miracle would have to refer to some special genesis of event, like telekinesis or supernatural intervention. However, once such event is established as capable of occurring in this world, then we would have to include it in our concept of the World, and it would thereby qualify as normal and natural in our expanded world-view. Thus, the term 'natural' is logically very relative; but we can still give it its understood connotation conventionally.

Also note: prediction is not, as commonly thought, the essential or even main attribute of prophecy. Prophecy seems to be primarily a high-level relationship to God - which, rather incidentally, implies special cognitive and other powers. The principal prophets, like Moses, Samuel, Elijah, Elisha, and so forth, are especially spiritual leaders of the Israelite and human community; their cognitive and other powers are mere means to this end, the outer garb of their profound dignity.

In conclusion, to return to the central topic of the present chapter, I think that the documentary evidence adduced above shows without shadow of a doubt that the Jewish religious tradition had a very clear understanding of the two logical laws of adduction well before Greek philosophy, let alone post-Renaissance Western philosophy. For those who believe in the Divine source and traditional dating of Deuteronomy, these laws of logic were God-given at Sinai some 3,300 years ago, almost 1,000 years before Aristotle's time. For those who doubt this, and regard the Book as of human and more recent origin, say around the First Exile period - these laws of logic are still a couple of hundred years older than Aristotle's discoveries![37]

However, it should be emphasized that (so far as I know) the Torah laws of adduction were never highlighted and discussed by the Rabbis of the Talmud and after *as logical principles applicable to all thought*. They evidently unconsciously practiced adduction in their debates on the law, but they never enshrined such reasoning in a hermeneutic principle or analyzed why it is effective. We could accuse them of having doctrinal reasons for this silence,

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[37] In the case of Deuteronomy, which concerns us here, some say that it dates from the reign of king Josiah, one of the last kings before the exile. Whatever the age of the Books of Moses, they were apparently well established by the time of Ezra. Judging by the Book of Ezra, this period may have been, rather, the starting point of Rabbinic Judaism, which reached its full momentum through the Mishnah and Gemara.

namely to prevent the development in people of scientific modes of thought, which could weaken religion; but the truth is more probably simply that they did not notice the hint in the Torah. Very probably, I would not have noticed it, either, had I not studied philosophy, long after the advent of modern science; credit must be given where it is due.

4. Logic and Mysticism.

One of the difficulties in religious thinking is its categorical expressions of knowledge.

There exists a tendency, in the human mind, to confuse conceptual insight with perception, and view them as having the same degree of probability. However, whereas perception (and its derivatives, which we term 'empirical fact') has a rather high level of credibility (rarely is what we perceive, as such, in an as near as possible unprocessed form, found incorrect), conceptual consciousness has broader possibilities, as it includes the imaginary, which allows us to propose alternative scenarios, and therefore relatively less credibility, *ab initio.*

For the simple mind, which has not reflected on epistemological issues, the mere event of thinking of a conceptual scenario in answer to some query, is sufficient in itself to justify that scenario. No further evidence is needed, no checking procedure. Of course, this is an extreme case. A person practicing this approach to knowledge full time, would be most likely in a nuthouse, I presume. Rather, we all practice such shortcuts to knowledge, though to varying degrees, and in some cases in different domains.

The danger here, is to confuse *speculation* with knowledge in its finished state.

Every insight or belief is strictly-speaking a speculation, which may be right or may be wrong. After proper evaluation, which is itself to some extent speculative, we may be closer to the truth, and may with more confidence declare it to be right or wrong. Such evaluation consists in examining the perceptual and conceptual context, all known fact and insight, and judging its consistency with the proposed newcomer, the thesis under scrutiny, and considering the mutual impact of these blocks of information. Furthermore, the context is in non-stop flux, so that the evaluation must constantly proceed and recur, to remain accurate. Only thus can we be reasonably sure.

In the early stages of human development, whether historical or individual, we tend to be less careful in our evaluations of knowledge. More maturely, we must regard our alleged knowledge more critically and fairly, without prejudice one way or the other, more objectively and freely. If we fail to, we in the long run must needs succumb to doubt, the structure is bound to seem shaky eventually. If it is strong, it will withstand all tests; if it is weak, it might be strengthened, or else does not deserve respect. This is a challenge religion, too, must face, to survive.

Logic has no *in principle* objection to mysticism. It has no prejudice with regard to the eventual *content* of the world. What concerns logic is *the morphology and aetiology of our knowledge*, the forms and processes which gave rise to it. With regard to mysticism (the "Qabalah"), it would seem to constitute an attempt to conceive scenarios - which are speculations, at first sight, as far as logic is concerned - to explain certain phenomena or texts.

Since the questions posed concern domains inaccessible to scientific investigation, the answers are, ultimately, inherently *unverifiable*, although some degree of confirmation, doubt, improvement or rejection may be possible.

In other words, there are propositions which are not likely to ever be proved right, or wrong, which may even be impossible to evaluate convincingly. They concern God, the Beginning of things, the End of days, and so on. They are beyond Man's mind, because they are out of his mental reach or outside of his universe. Anything said about them, positive or negative, is purely speculative, from a normal human point of view. Even what is claimed Divinely inspired, though it may well indeed be so in reality, is viewed by logic as speculative; since *we*, ordinary people, when we hear such claims, are forced to consider the possibility that the speaker may not have been inspired, for instance. It is a stand-off.

We must neither reject offhand, nor be naive, but must do as much evaluation as possible, and still remain open at the end. This is to some extent implied by the Biblical laws of adduction. The fact that these laws are found in the Torah, testifies to the need for a certain degree of empiricism and exercise of the critical faculty. It is an admission that men (or women), by their nature, may confuse their imaginations and speculations with reality, and often come forth with unfounded claims of Divine inspiration. We are called upon to judge carefully.

Even within religion, if not especially in that realm, people can very easily err, and tend to accept the offerings of their conceptual faculty at face value. Which does not mean, let us make clear, that such error is inevitably or even usually implied within religion.

> The speculation concerning heavenly spheres provides us with a telling example. This doctrine, made popular by the Safed mystics (16th Cent. CE), is reputed to be rooted in the Talmudic literature and regarded as Jewish tradition of Mosaic origin, and is for this reason considered as certain. Yet if we look at the historical record, a different picture emerges.
>
> Seven celestial bodies close to Earth were known since antiquity, namely the Sun, the Moon, and the five planets Mercury, Venus, Mars, Jupiter and Saturn. These bodies were visibly mobile, in distinction from the Stars which seemed relatively fixed[38]. To explain the suspension of these celestial objects and the daily rotation of those closer to us in the sky, Plato and Aristotle (5th-4th Cent. BCE) proposed the theory that there are concentric spheres around the Earth, seven of them on which the heavenly bodies travel, and additionally an eighth sphere in which the stars, or heavenly lights, are imbedded[39]. This theory was found to present certain difficulties, and was consequently much refined by Ptolemaeus of Alexandria (2nd Cent. CE). The Ptolemaic model of the universe, as it became known, remained accepted truth for centuries thereafter, until the development of the Copernican model.
>
> By Talmudic times the idea of heavenly spheres was culturally well-installed and considered obvious. It is of course not totally inconceivable that it antedated the Greeks, but there is no written evidence to this effect and it seems much more probable that it arrived in the Middle East in the wake of Alexander the Great (who was a pupil of Aristotle). The Seven Heavens became a fixture of Jewish mystical speculation, serving as much to transmit spiritual and ethical teachings as to explain various aspects of our physical world. However, as it turned out, it was a bad investment: new discoveries in relatively modern times in the field of Astronomy have completely overturned this model.
>
> Since Copernicus, we learned that the Earth, the Moon and the five planets rotate around the Sun (the Earth does so in 365.25 days), and that the appearance of rotation of the Sun around the Earth is rather due to the latter's daily rotation around its own axis. Furthermore, the Sun was found to be a

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38 Their positions were first mapped, apparently, by the Chaldeans. The maps depict the Constellations dear to Astrologers.

39 More precisely, the stars were supposed to be holes in the fabric of the Eighth Heaven, through which light was visible.

> burning ball, a fundamentally different entity from the six other neighbours of Earth; the Stars were understood to be burning heavenly bodies like the Sun, and found to be moving in various ways; the Moon was distinguished by its rotation around the Earth from the five other planets, whose trajectories were rather parallel to that of the Earth[40]. Furthermore, previously unknown planets, not to mention the Asteroids, were discovered: in 1781, the planet Uranus; in 1846, Neptune; in 1930, Pluto; and many of the eight planets were found to have moons of their own; our Solar system was found to be but an average member of a galaxy of some 100,000 stars, and the universe was found to consist of a multitude of scattered such galaxies each with a myriad of stars and planets and moons and comets, all moving in various ways. And so forth.[41]
>
> Now, the fact is that the Talmudic luminaries had no advance inkling of these major developments in Astronomical science, and by all evidence later Jewish mystics like those of Safed were ignorant of them even as they were occurring all around them. That these people all constructed doctrines around theories which turned out to be unsound, or even out of date in their own times, just goes to show that they cannot be considered, by any stretch of the imagination, to have been omniscient and infallible. The *Torah* laws of adduction have to be applied, and speculations which go against empirical evidence have to be rejected, however attached we may be to their spiritual and ethical message. The only face-saving thing we can do is allegorize, and say that the Spheres are spiritual domains, in a non-physical dimension of existence; or that they refer to different levels of consciousness or states of mind.[42]

We may go further still, given the clear formulation of the laws of adduction in the Torah. The fact that the Torah teaches this logical (inductive) process makes it *kosher*, and indeed a *mitzvah*; it cannot be claimed by traditionalists to be a newfangled, foreign technique, an invention of atheist or non-Jewish scientists. But moreover, if we look at the context in which these laws are formulated, it becomes clear that they are to be applied very widely (to the extent possible) - not only to the far-out speculations of mystics, but also to the down-to-earth legal discussions of Halakhists.

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40 We *can*, in truth, still today, conceive of the celestial bodies as 'rotating' around the Earth. That is, we can construct a model in which the Earth is Cartesian origin (geometrical zero point) and all other bodies trace various paths relative to that origin. Such a model, which is the Ptolemaic, would simply reflect the way we observe the sky, standing here on Earth. However, the paths traced by the celestial bodies in such a model are very complicated and difficult to explain and predict. The value of the Copernican model, which shifted the center of the world (actually, of our solar system), was its ability to simplify the mathematical problem posed by the observed trajectories. Galileo and Newton were then able to provide an explanation, with the concept of gravity and the laws of mechanics, which neatly fitted in with this model.

41 It is not my object, here, to go into the history of Astronomy; but I have to list some facts to put certain yeshivah students, steeped *only* in traditional learning, up to date! In any case, note well, the mystic number of Seven cannot be changed into a mystic number of Ten.

42 Or again, that they symbolize the stages of Creation or the veils separating us from the ultimate reality of the One. The Spheres postulate is, of course, but one component of the mystical theory of the *Sephirot*. Another major component is the metaphysical idea of Emanation, according to which the existence of the world is continually produced by emanation from God, through the successive layers of the spheres. This idea is supposed to reinforce the concept of the separateness of God, His distance and insulation from the lowly material world, while at the same time stressing His sustenance of it. Our rejection of the Spheres idea, or at least of its physical version, does not imply a rejection of the Emanationism. However, here again, we should take note that the latter theory has, according to historians, Greek roots, coming to full expression in Neoplatonism, with Plotinus (3rd Cent. CE). All this goes to show that philosophy (here, its natural or metaphysical branches) has historically often enough affected Judaic thought, more so than certain traditionalist opponents of philosophy were aware of or would care to admit.

For, if it is permissible, indeed imperative, to evaluate the truth of alleged *prophecies*, then *a-fortiori*, all the more so, is it ethically, according to the Torah, possible and necessary to evaluate the pronouncements of Rabbis, who are of lesser rank in the spiritual hierarchy. And again, if we may and must evaluate these and those religious leaders using *adductive* techniques, then *a-fortiori*, all the more so, we may and must do so with *all other* inductive and deductive techniques, which are more certain logically. It seems to me that these inferences are incontrovertible.

The Torah, in the above described laws, makes a clear statement in favour of empiricism and use of the critical faculty. It does not recommend an unconditional credulity towards apparent 'authorities': it demands integrity, a healthy reference to objective fact and an intellectual judgment. The Torah does not condone the obsessive 'believer', who denies his or her senses and his or her mind in pursuit of his or her fantasies; or, sheeplike, of other people's fantasies, be they 'sincere' or manipulative. It recommends a respect for truth, and due process in ensuring that truth. This viewpoint is upheld in other passages of the Torah, notably Exod. 23:1-3 and Lev. 19:15...

> *Thou shalt not utter a false report; put not thy hand with the wicked to be an unrighteous witness. Thou shalt not follow a multitude to do evil, neither shalt thou bear witness in a cause to turn aside after a multitude to pervert justice; neither shalt thou favour a poor man in his cause.*
>
> *...nor favour the person of the mighty; but in righteousness thou shalt judge thy neighbour.*

These statements (and others like them, e.g. Exod. 23:6-9[43]; see also the relative commentaries) are traditionally understood as relating especially to jurisprudence, to the witnesses and judges in a tribunal. A witness is bound to say the truth precisely, neither adding nor omitting information, not confusing fiction or evaluation with fact; a witness must not, either, be moved by love, hate or indifference, nor let others sway his or her testimony, for good or bad, by means of bribery, threats, or even 'ideological' considerations. A judge is bound to obtain and consider all the facts of the case; he must not be diverted by any personal passions, or allow anyone to interfere with his judgment, to influence it unduly; and at the moment of judgment, he must *exercise* his judgment to the best of his ability, and not *surrender* his considered opinion, whether to higher authority (in the case of less prestigious judges, who are required to vote first) or to majority opinion (in the case of the more senior judges, who vote last).

The intent of such passages of the Torah is obviously primarily juridical, to found a just society. But to achieve such a social and political result, a strong culture of honesty and respect for truth above all is required. This implies ethical work, at a deeper, more personal level; a habit of using one's faculties of cognition to their fullest potential, and independently of inner or outer pressures logically irrelevant to the issues at hand. If people habitually fail to put a supreme value on truth, then when the moment of witnessing or judging arrives, they

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[43] We may also mention the Ninth Commandment, concerning false witness against one's neighbor (Exod. 20:13, Deut. 5:17). Some commentators have referred to the commandments relating to just weights and measures (Lev. 19:35-36, "ye shall do no unrighteousness in judgment...," and Deut. 25:13-16), which may be viewed more broadly as calls to intellectual honesty.

may easily stumble. Thus, the Torah's teaching, in passages like the ones on prophecy and on justice is, if only indirectly, essentially *cognitive*. With regard to religious and lay *authorities*, while the Torah elsewhere upholds them firmly (as pillars of a good society), it here (I suggest) reminds us that they are human, capable of errors or lies, and therefore to be evaluated honestly (that, too, being good for society).

3. THE FORMALITIES OF *A-FORTIORI* LOGIC.

We shall in this chapter present, as a propaedeutic, the main formalities of a-fortiori logic and in the next three chapters consider its roots and applications within Judaic logic[44]*. All the findings presented here are original.*

1. The Valid Moods.

Let us begin by listing and naming all the *valid* moods of a-fortiori argument[45] in abstract form; we shall have occasion in later chapters to consider examples. We shall adopt a terminology which is as close to traditional as possible, but it must be kept in mind that the old names used here may have new senses (in comparison to, say, their senses in syllogistic theory), and that some neologisms are inevitable in view of the novelty of our discoveries.

An explicit a-fortiori argument always involves three propositions, and *four* terms. We shall call the propositions: the major premise, the minor premise, and the conclusion, and always list them in that order. The terms shall be referred to as: the major term (symbol, **P**, say), the minor term (**Q**, say), the middle term (**R**, say), and the subsidiary term (**S**, say). In practice, the major premise is very often left unstated; and likewise, the middle term (we shall return to this issue in more detail later).

Table 3.1 Classification of A-Fortiori Arguments.

FORM	**STRUCTURE**	
Copulative	(1) **Subjectal**	(2) **Predicatal**
Implicational	(3) **Antecedental**	(4) **Consequental**
POLARITY	**ORIENTATION**	
(a) **Positive**	**Minor to major**	**Major to minor**
(b) **Negative**	**Major to minor**	**Minor to major**

[44] See also, after reading this chapter, **Appendix 1**, for further notes on a-fortiori.

[45] Such arguments occur quite often in everyday discourse. I give you a couple of examples: "if he can readily run a mile in 5 minutes, he should certainly be able to get here (1/2 a mile from where he is now) in 15 minutes." Or again: "if my bus pass is transferable to other adults, I am sure it can be used by kids."

We shall begin by analyzing "copulative" forms of the argument. There are essentially four valid moods. Two of them subjectal in structure, and two of them predicatal in structure; and for each structure, one of the arguments is positive in polarity and the other is negative.

a. **Subjectal moods.**

(i) **Positive** version. (**Minor to major**.)

P is more R than Q (is R),
and, **Q is R enough to be S**;
therefore, all the more, **P is R enough to be S**.

As we shall see further on, a similar argument with P in the minor premise and Q in the conclusion ("major to minor") would be invalid.

(ii) **Negative** version. (**Major to minor**.)

P is more R than Q (is R),
yet, **P is *not* R enough to be S**;
therefore, all the more, **Q is *not* R enough to be S**.

As we shall see further on, a similar argument with Q in the minor premise and P in the conclusion ("minor to major") would be invalid.

b. **Predicatal moods.**

(i) **Positive** version. (**Major to minor**.)

More R is required to be P than to be Q,
and, **S is R enough to be P**;
therefore, all the more, **S is R enough to be Q**.

As we shall see further on, a similar argument with Q in the minor premise and P in the conclusion ("minor to major") would be invalid.

(ii) **Negative** version. (**Minor to major**.)

More R is required to be P than to be Q,
yet, **S is *not* R enough to be Q**;

therefore, all the more, **S is *not* R enough to be P**.

As we shall see further on, a similar argument with P in the minor premise and Q in the conclusion ("major to minor") would be invalid.

The expression "**all the more**" used with the conclusion is intended to connote that the inferred proposition is more "forceful" than the minor premise, as well as suggest the quantitative basis of the inference (i.e. that it is a-fortiori). Note that instead of the words "and" or "yet" used to introduce the minor premise, we could just as well have used the expression "nonetheless", which seems to balance nicely with the phrase "all the more".

The role of the major premise is always to relate the major and minor terms (P and Q) to the middle term (R); the middle term serves to place the major and minor terms along a quantitative continuum. The major premise is, then, a kind of *comparative* proposition of some breadth, which will make possible the inference concerned; note well that it contains three of the terms, and that its polarity is always positive (this will be demonstrated further down). The term which signifies a greater measure or degree (more) within that range, is immediately labeled the major; the term which signifies a smaller measure or degree (less) within that range, is immediately labeled the minor (these are conventions, of course). P and Q may also conveniently be called the "extremes" (without, however, intending that they signify extreme quantities of R).

> Note that here, unlike in syllogism, the major premise involves both of the extreme terms and the minor premise may concern either of them; thus, the expressions major and minor terms, here, have a different value than in syllogism, it being the relative content of the terms which determines the appellation, rather than position within the argument as a whole. Furthermore, the middle term appears in all three propositions, not just the two premises.

The function of the minor premise is to positively or negatively relate one of the extreme terms to the middle and subsidiary terms; the conclusion thereby infers *a similar relation* for the remaining extreme. If the minor premise is positive, so is the conclusion; such moods are labeled positive, or *modus ponens* in Latin; if the minor premise is negative, so is the conclusion; such moods are labeled negative, or *modus tollens*. Note well that the minor premise may concern either the major or the minor term, as the case may be. Thus, the inference may be "from major (term, in the minor premise) to minor (term, in the conclusion)" - this is known as inference *a majori ad minus*; or in the reverse case, "from minor (term, in the minor premise) to major (term, in the conclusion)" - this is called *a minori ad majus*.

There are *notable differences between subjectal and predicatal a-fortiori*. In subjectal argument, the extreme terms have the logical role of subjects, in all three propositions; whereas, in predicatal argument, they have the role of predicates. Accordingly, the subsidiary term is the predicate of the minor premise and conclusion in subjectal a-fortiori, and their subject in predicatal a-fortiori.

Because of the functional difference of the extremes, the arguments have opposite orientations. In subjectal argument, the positive mood goes from minor to major, and the negative mood goes from major to minor. In predicatal argument, the positive mood goes from

major to minor, and the negative mood goes from minor to major. The symmetry of the whole theory suggests that it is exhaustive.

With regard to the above mentioned *invalid* moods, namely major-to-minor positive subjectals or negative predicatals, and minor-to-major negative subjectals or positive predicatals, it should be noted that the premises and conclusion are not in conflict. The invalidity involved is that of a non-sequitur, and not that of an antinomy. It follows that such arguments, though deductively valueless, can, eventually, play a small inductive role (just as invalid apodoses are used in adduction).

"Implicational" forms of the argument are *essentially similar in structure* to copulative forms, except that they are more broadly designed to concern theses (propositions), rather than terms. The relationship involved is consequently one of implication, rather than one of predication; that is, we find in them the expression "implies", rather than the copula "is".[46]

c. **Antecedental moods.**

(i) **Positive** version. (**Minor to major**.)

P implies more R than Q (implies R)
and, **Q implies enough R to imply S**; **therefore,**
all the more, **P implies enough R to imply S**.

(ii) **Negative** version. (**Major to minor**.)

P implies more R than Q (implies R)
yet, **P does *not* imply enough R to imply S**; **therefore,**
all the more, **Q does *not* imply enough R to imply S**.

d. **Consequental moods.**

(i) **Positive** version. (**Major to minor**.)

More R is required to imply P than to imply Q
and, **S implies enough R to imply P**; **therefore,**
all the more, **S implies enough R to imply Q**.

[46] "Implication" is to be understood here in a generic sense, applicable to all types of modality - we shall avoid more specific senses, to keep things clear and simple.

(ii) **Negative** version. (**Minor to major**.)

More R is required to imply P than to imply Q
yet, **S does *not* imply enough R to imply Q**; **therefore,**
all the more, **S does *not* imply enough R to imply P**.

We need not repeat everything we said about copulative arguments for implicational ones. We need only stress that moods not above listed, which go from major to minor or minor to major in the wrong circumstances, are invalid. The essentials of structure and the terminology are identical, *mutatis mutandis*; they are two very closely related sets of paradigms. The copulative forms are merely more restrictive with regard to which term may be a subject or predicate of which other term; the implicational forms are more open in this respect. In fact, we could view copulative arguments as special cases of the corresponding implicational ones[47].

A couple of comments, which concern all forms of the argument, still need to be made.

The standard form of the major premise is a comparative proposition with the expression "**more...than**" (superior form). But we could just as well *commute* such major premises, and put them in the "**less...than**" form (inferior form), provided we accordingly reverse the order in it of the terms P and Q. Thus, 'P is more R than Q' could be written 'Q is less R than P', 'More R is required to be P than to be Q' as 'Less R is required to be Q than to be P', and similarly for implicational forms, without affecting the arguments. These are mere eductions (the propositions concerned are equivalent, they imply each other and likewise their contradictories imply each other), without fundamental significance; but it is well to acknowledge them, as they often happen in practice and one could be misled. The important thing is always is to know which of the terms is the major (more R) and which is the minor (less R).

Also, it should also be obvious that the major premise could equally have been an egalitarian one, of the form "**as much...as**" (e.g. 'P is as much R as Q (is R)'). The arguments would work equally well (P and Q being equivalent in them). However, in such cases it would not be appropriate to say "all the more" with the conclusion; but rather use the phrase "**just as much**". Nevertheless, we must regard such arguments as still, in the limit, a-fortiori in structure. The expression "all the more" is strictly-speaking a redundancy, and serves only to signal that a specifically a-fortiori kind of inference is involved; we could equally well everywhere use the word "therefore", which signifies for us that an inference is taking place, though it does not specify what kind.

It follows that each of the moods listed above stands for three valid moods: the superior (listed), and corresponding inferior and egalitarian moods (unlisted).

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47 The logical relationship between "is" and "implies" is well known. X "is" Y, in class-logic terminology, if it is subsumed/included by Y, which does not preclude other things also being Y. X "implies" Y, if it cannot exist/occur without Y also existing/occurring, even if as may happen it is not Y. Thus, if X "is" Y, it also "implies" Y; but if X "implies" Y, it does not follow that it "is" Y. In other words, "is" implies (but is not implied by) "implies"; "implies" is a broader more generic concept, which covers but is not limited to "is", a narrower more specific concept.

Lastly, it is important to keep in mind, though obvious, that the form 'P is more R than Q' means 'P is more R than Q *is R*' (in which Q is as much a subject as P, and R is a common predicate), and should not be interpreted as 'P is more R than *P is* Q' (in which P is the only subject, common to two predicates Q and R, which are commensurable in some unstated way, such as in spatial or temporal frequency, allowing comparison between the degrees to which they apply to P). In the latter case, R cannot serve as middle term, and the argument would not constitute an a-fortiori. The same can be said regarding 'P implies more R than Q'. Formal ambiguities of this sort can lead to fallacious a-fortiori reasoning[48].

A-fortiori logic can be extended by detailed consideration of the rules of **quantity**. These are bound to fall along the lines established by syllogistic theory. A subject may be plural (refer to all, some, most, few, many, a few, etc. of the members of a class X) or singular (refer to an individual, or to a group collectively, by means of a name or an indicative *this* or *these* X). A predicate is inevitably a class concept (say, Y), referred to wholly (as in 'is not Y') or partly (as in 'is Y'); even a predicate in which a singular term is encrusted (such as 'pay Joe') is a class-concept, in that many subjects may relate to it independently ('Each of us paid Joe'). The extensions (the scope of applicability) of any class concept which appears in two of the propositions (the two premises, or a premise and the conclusion) must overlap, at least partly if not fully. If there is no guarantee of overlap, the argument is invalid because it effectively has more than four terms. In any case, the conclusion cannot cover more than the premises provide for.

In *subjectal* argument, whether positive or negative, since the subjects of the minor premise and conclusion are not one and the same (they are the major and minor terms, P and Q), we can only quantify these propositions if the major premise reads: "for every instance of P there is a corresponding instance of Q, such that: the given P is more R than the given Q". In that case, if the minor premise is general, so will the conclusion be; and if the minor premise is particular, so will the conclusion be (indefinitely, note). This issue does not concern the middle and subsidiary terms (R, S), since they are predicates. In *predicatal* argument, whether positive or negative, the issue is much simpler. Since the minor premise and conclusion share one and the same subject (the subsidiary term, S), we can quantify them at will; and say that whatever the quantity of the former, so will the quantity of the latter be. With regard to the remaining terms (P, Q, R), they are all predicates, and therefore not quantifiable at will. The major premise must, of course, in any case be general.

All the above is said with reference to copulative argument; similar guidelines are possible for implicational argument. These are purely deductive issues; but it should be noted that in some cases the a-fortiori argument as a whole is further complicated by a hidden argument by analogy from one term or thesis to another, so that there are, in fact, more than four terms/theses. In such situations, a separate inductive evaluation has to be made, before we can grant the a-fortiori inference.

Another direction of growth for a-fortiori logic is consideration of **modality**. In the case of copulative argument, premises of different types and categories of modality would need to be examined; in the case of implicational argument, additionally, the different modes of implication would have to be looked into. Here again, the issues involved are not peculiar to a-fortiori argument, and we may with relative ease adapt to it findings from the fields concerned with categorical and conditional propositions and their arguments. To avoid losing the reader in minutiae, we will not say any more about such details in the present volume.

[48] For example: Jane is more good-looking than a nice girl; she is good-looking enough to win a beauty contest; therefore, a nice girl is good-looking enough to win a beauty contest.

2. Validation Procedures.

Once examined in their symbolic purity, the arguments listed above all appear as *intuitively obvious*: they 'make sense'. We can, additionally, easily convince ourselves of their logical correctness, through a visual image as in Cartesian geometry. Represent R by a line, and place points P and Q along it, P being further along the line than Q - all the arguments follow by simple mathematics. However, the formal validation of valid moods, and invalidation of invalids, are essential and will now be undertaken.

The propositions colloquially used as premises and conclusions of a-fortiori arguments are entirely reducible to known forms, namely (where X, Y are any terms or theses, as the case may be) to categoricals ('X is Y', 'X is not Y'), conditionals ('if X then Y', ' if X not-then Y') and comparatives (X > or = or < Y, or their negations; and X ⊃ Y, or its negation[49]). Consequently, a-fortiori arguments may be systematically explicated and validated by such reductions. We shall call the colloquial forms *bulk* forms, and the simpler forms to which they may be reduced their *pieces*.

Let us first consider the major premises of a-fortiori arguments, whose forms we will label ***commensurative***, since they measure off the magnitudes of the major and minor terms/theses (respectively P, Q) in the scale of the middle term/thesis (R).

a. Subjectals:[50]

The bulk form: **What is P is more R than what is Q (is R)**;

its pieces:

What is P, is to a certain degree R (say, Rp),
What is Q, is to a certain degree R (say, Rq),
and Rp is greater than Rq.

This concerns the superior form (briefly put, 'P is more R than Q'). Similarly, for the egalitarian ('P is as R as Q') and inferior ('P is less R than Q') forms[51], except that for them

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49 Note the following. For two *magnitudes* of something, like X and Y: if 'X is greater than Y', then 'X implies, but is not implied by, Y'; if 'X equals Y', then 'X implies and is implied by Y'; if 'X is smaller than Y', then 'X is implied by, but does not imply, Y'. This merely tells us, for example, that if I have eight apples and you have five, then I have as many apples as you have (plus some): eight implies five. For two *classes* of something, like X and Y: if 'X includes Y', then 'Y implies X' (notice the reversal of order). Here again, an example: since 'fruits' includes 'apples', then whenever we have apples it follows that we have fruits. Thus, we can elicit conditional propositions from comparative relationships, whether strictly numerical or relating to inclusion (symbol, ⊃).

50 Here, the subjects could easily be singular, but to display symmetries with predicatal forms I will concentrate on classes.

51 Ignoring, in their case, our previous convention that P should represent the larger quantity of R, and Q the lesser.

Rp=Rq and Rp<Rq, respectively. Thusly for copulatives; with regard to implicationals (bulk form, 'P implies more/as much/less R than/as Q implies'), the first two pieces take the form: 'P implies Rp' and 'Q implies Rq' and the third piece remains the same.

b. Predicatals:

The bulk form: **More R is required to be P than to be Q**;

its pieces:

What is to a certain degree R (say, Rp), is P,
What is to a certain degree R (say, Rq), is Q,
and Rp is greater than Rq.

Again, this concerns the superior form. The corresponding egalitarian and inferior forms[52] differ only in that for them the third piece reads Rp=Rq and Rp<Rq, respectively. Thusly for copulatives; with regard to implicationals (bulk form, 'More/as much/less R is required to imply P than/as to imply Q') there is little difference, except that the first two pieces take the form: 'Rp implies P' and 'Rq implies Q'.

Note that given the first two pieces, the superior, egalitarian and inferior bulk forms are exhaustive alternatives, since the available third pieces are so; that is, if any two are false, the third must be true. Note also the symmetries between subjectal and predicatal forms, after reduction to categorical/conditional and comparative propositions, despite their initial appearance of diversity; their differences are in the relative positions of the terms.

It should be clear that the comparative propositions Rp>Rq, Rp=Rq, Rp<Rq, seem simple enough when we deal with exact magnitudes. But in the broadest perspective, Rp and Rq may each be an exact magnitude, or a single interval, ranging from an upper bound to a lower bound (including the limits), or a disjunction of several intervals; this can complicate things considerably. To keep things simple, and manageable by ordinary language, we will assume Rp and Rq to be, or behave as, single points on the R continuum; when P or Q are classes rather than individuals, we will just take it for granted that the propositions concerned intend that the stated relation through R is generally true of all individual members referred to, one by one.

We need also emphasize, though we will avoid dealing with negative commensuratives in the present work so as not to complicate matters unduly, that the strict *contradictory* of each bulk form is an inclusive disjunction of its three pieces. For example, in the case of the copulative superior subjectal form, it would be, briefly put: 'Some P are not R, *and/or* some Q are not R, *and/or* Rp = or < Rq'; similarly, mutatis mutandis, for the other forms (remembering, for implicationals, that the negation of 'if... then...' is 'if... not-then...', and not 'if... then-not...' which is merely contrary). We may continue to use the same labels (superior, egalitarian and inferior) for negative propositions, even though in fact the meaning is reversed by negation, in order that the intent of the original (positive) forms be kept in mind.

Thus viewed in pieces, the negations of major premises are clear enough; but we must forewarn that the negative versions of the bulk forms are easily misinterpreted. For example: 'What is P is *not* more R than what is Q' might be taken to mean 'What is P is R as much as or less than what is Q' which is not equivalent to the strict contradictory, since it still maintains the conditional pieces, while denying

[52] Ignoring, here again, our previous convention that P should represent the larger quantity of R, and Q the lesser.

only the comparative piece. Other interpretations might be put forward. For these reasons, negatives are best expressed by prefixing '**Not-**' to the whole positive proposition concerned.

For logicians (as against grammarians) the precise interpretation of variant forms is not so important; what matters is what *conventions* we need to establish, as close as possible to ordinary language, to assure full formal treatment. We can do this without affecting the versatility of language, because *it is still possible to express alternative interpretations by means of the language already accepted as formal*.

Let us now consider the forms taken by minor premises and conclusions of a-fortiori arguments, which we will call ***suffective***, since, broadly put, they express the sufficiency (or its absence) of a term/thesis to satisfy some quantitative condition (the middle term/thesis, R) to obtain some result[53]. In subjectal argument the minor premise and conclusion have P or Q (the extreme terms) as subject and S (the subsidiary term) as predicate, whereas in predicatal argument they have S as subject and P or Q as predicate, but otherwise the form remains identical; for this reason, we may deal with all issues using a single paradigm, having X and Y as subject and predicate respectively and R as middle term.

a. Positives:

The bulk form: **X is R enough to be Y**;

its pieces:

Whatever is X, is to a certain degree R (say, Rx),
Whatever is to a certain degree R (say, Ry), is Y,
and Ry *includes* Rx.[54]

This concerns the copulative form; in the case of the implicational form 'X implies R enough to imply Y', the first two pieces are 'X implies Rx' and 'Ry implies Y', and the third piece is the same.

In the broadest perspective, Ry may be an exact magnitude, or a single interval, ranging from an upper bound to a lower bound (including the limits), or a disjunction of several intervals. Similarly for Rx. Therefore, Rx is "included in" Ry, if and only if every value of Rx is a value of Ry; if only some points overlap, or every value of Ry is a value of Rx but not conversely, then Rx may not be said to be (wholly) "included in" Ry by our standards. However, very commonly, Ry expresses the *threshold* of a continuous and open-ended range, as of which, and over and above which or under and below which, the consequent Y occurs; while Rx is often a point (for an individual X) or a limited range (for the class of X).

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53 I introduced the word 'suffective' for lack of a better one; had I called such propositions 'sufficient' there would have been ambiguity and confusion when the sufficiency of the proposition as such is discussed, in contrast to the sufficiency of one of its terms or theses.

54 i.e. Rx refers to one or more of the points signified by Ry. Note well the implications of these propositions: What is X, is Y (first two pieces, by syllogism), and What is included in Rx, is included in Ry (third piece, by eduction; we cannot rightly say 'What *is* Rx *is* Ry', because we are not dealing with species/genera, but with ranges).

Since negative suffectives (unlike negative commensuratives) are used in the primary forms of a-fortiori argument which we identified earlier, they must be given attention too. The strict *contradictory* of the above conjuncts of two categoricals and one comparative is an inclusive disjunction of their denials:

b. Negatives:

The bulk form: **X is *not* R enough to be Y**;

its pieces:

Some things which are X are not a certain degree of R (say, not Rx), *and/or*
Some things which are to a certain degree R (say, Ry) are not Y, *and/or*
Ry does not include Rx.[55]

This concerns the copulative form; in the case of the implicational form 'X does not imply R enough to imply Y', the pieces are 'X does not imply Rx' *and/or* 'Ry does not imply Y', *and/or* Ry does not include Rx.

> Here (unlike in the case of commensuratives) we have chosen, *by convention* - because we must have some practical verbal tool for lack of sufficiency, or insufficiency - to adopt a form with the negation encrusted in it to signify the generic form of negation, namely '**Not**-{X is R enough to be Y}'. But it must be kept in mind that this language, which we have frozen to one of its colloquial senses for the purposes of a formal analysis, may in practice be interpreted variously, as 'X is not-R, enough to be Y', or as 'X is R, *but* not-enough to be Y', or as 'X is not R-enough to be Y', for instances. I will not here say more about such variants, but only wish to give the reader an idea of the complexities involved. *In general, absolute precision can only be attained through the explicit listing of the pieces intended, be they positive, negative or unsettled*.

Having sufficiently analyzed the propositional forms involved for our purposes here, we can now proceed with reductive work on a-fortiori *argument* proper. The positive moods here considered are the paradigms of the form; the negative moods are really derivative. The negative moods can always be derived from the positive moods by means of a *reductio ad absurdum*, just like in the validation of syllogisms or apodoses. That is, we can say: "*for if the proposed conclusion is denied, then (in conjunction with the same major premise) the given minor premise would be contradicted*".

- Positive Subjectal (minor to major):

P is more R than Q (is R),
Q is R enough to be S;
so, P is R enough to be S.

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[55] Note well that these three pieces do *not* imply (nor deny) that: What is X is Y; nor that: If something is included in Rx, then it is included in Ry.

Validation: translate the bulk forms into their pieces (here, expressed as hypotheticals, for the sake of simplicity; these are, tacitly, of the extensional type, to be precise), and verify that the conclusion is implicit in the premises by well-established (hypothetical) arguments.

Major premise: (i) if P then Rp, and
(ii) if Q then Rq, and
(iii) Rp > Rq (implying: if Rp then Rq).
Minor premise: (iv) if Rs then S, and
(v) if Q then Rq, and
(vi) Rs includes Rq (implying: if Rq then Rs).

Paths of Inference:

- we know directly, from (iv) that "if Rs then S", and from (i) that "if P then Rp"; we still need to show, indirectly that "if Rp then Rs";
- from (iii), we know that Rp implies Rq, if we understand that Rp>Rq signifies that wherever Rp occurs, Rq is implied to have already occurred;
- and from (vi) we know that Rq implies Rs;
- whence, by syllogism, Rp implies Rs, or in other words, Rs includes Rp. This is true, note well, *granting that Rs refers to a continuously increasing open-ended range*, for if such a range (=>Rs) includes a number (Rq), it (=>Rs) necessarily includes all higher numbers (like Rp).[56]

Conclusion: therefore,
if Rs then S, and
if P then Rp, and
Rs includes Rp.
which is the desired result.

One can see, here, why, if the minor premise was with P rather than Q, no conclusion would be drawable (i.e. major to minor is *invalid*). For then, from Rp implies Rq and Rp implies Rs, there would be no guarantee that Rq implies Rs.

- Positive predicatal (major to minor):

More R is required to be P than to be Q,
S is R enough to be P;
so, S is R enough to be Q.

[56] Note incidentally that pieces (ii) and (v), which are the same proposition, if Q then Rq, are not used to draw the conclusion; they are technically redundant.

Validation: translate the bulk forms into their pieces (here, again, expressed as hypotheticals, for the sake of simplicity), and verify that the conclusion is implicit in the premises by standard (hypothetical) arguments.

Major premise:	(i) if Rp then P, and
	(ii) if Rq then Q, and
	(iii) Rp > Rq (implying: if Rp then Rq).
Minor premise:	(iv) if Rp then P, and
	(v) if S then Rs, and
	(vi) Rp includes Rs (implying: if Rs then Rp).

Paths of Inference:

- we know directly, from (ii) that "if Rq then Q", and from (v) that "if S then Rs"; we still need to show, indirectly that "if Rs then Rq";
- from (vi) we know that Rs implies Rp;
- and from (iii), we know that Rp implies Rq;
- whence, by syllogism, Rs implies Rq, or in other words, Rq includes Rs. This is true, note well, *granting that Rp refers to a continuously increasing open-ended range*, for if such a range (=>Rp) includes a number (Rs), then a longer range, i.e. one with a lower minimum (like =>Rq), necessarily includes that number (Rs).[57]

Conclusion:	therefore,
	if Rq then Q, and
	if S then Rs, and
	Rq includes Rs.

which is the desired result.

One can see, here, why, if the minor premise was with Q rather than P, no conclusion would be drawable (i.e. minor to major is *invalid*). For then, from Rp implies Rq and Rs implies Rq, there would be no guarantee that Rs implies Rp.

All the above is applicable equally to copulative and implicational a-fortiori argument, and (as already stated) the negative moods are easily derived. These dissections make evident ***the formal similarity and complementarity between subjectal and predicatal arguments***. Although on the surface their uniformity is not very obvious, deeper down their essential symmetry becomes clear. And this serves to confirm the exhaustiveness of our treatment. Also note: our ability to reduce a-fortiori argument to chains (known as *sorites*) of already

[57] Note incidentally, here, that pieces (i) and (iv), which are the same proposition, if Rp then P, are not used to draw the conclusion.

established and more fundamental arguments, signifies that this branch of logic, though of value in itself, is derivative - a corollary which does not call for new basic assumptions.

In view of the above (and certain additional details mentioned below) the formal definition of a-fortiori argument we would propose is, briefly put: ***a form of inference involving one commensurative and two suffective propositions, sharing four terms or theses.*** Which two of the propositions are combined as premises, and what their specific forms are (copulative or implicational), and the respective polarities, quantities and modalities which yield valid moods, and the placement of the terms or theses, are all questions automatically implied in that definition's breadth and the nature of the propositions referred to in it.

3. Additional Details.

a. The arguments developed above can be validated only under the formal limitations initially mentioned, namely that the ranges involved be specifically *continuously increasing and open-ended*. A-fortiori reasoning remains simple and straightforward only so long as we grant such specific conditions; but if we venture into more difficult situations, with irregular ranges - such as a range with *a lower limit* or *an upper limit* or a *broken* range - the arguments may no longer be automatically relied on and we would have to develop moods with more complicated specifications to ensure inferences. For such reasons, the arguments we have described must be viewed as operative '**under normal conditions**', namely the conditions we have already specified in the course of our study. Effectively, these conditions are tacit additional premises.

A larger theory of a-fortiori would require much more sophisticated formal tools - a much more symbolic and mathematical treatment, which is outside of the scope of the present study. I do not want to go into overly picky detail; these are very academic issues. However, we might here succinctly consider *the language* through which we colloquially express such inhibitions to a-fortiori arguments, signifying thereby that the situation under consideration is *abnormal*. Conjunctions like 'although... still...' and the like, help to fulfill this function. The following are examples of such statements; they are not arguments, note well, but statements consisting of three sentences which signal an abnormal situation, inhibiting a-fortiori inference from the first two sentences to a denial of the third.

Consider the following statements in subjectal form:

Though P is more R than Q and Q is R enough to be S,

still, P is too much R to be S.

This statement tells us that we cannot draw the normal a-fortiori conclusion from the first two sentences, namely 'P is R enough to be S'. Here, the condition R for S has an upper limit, which Q fits into, yet P surpasses. Similar statements may appear in predicatal form; for example:

Though more R is required to be P than to be Q, and S is R enough to be P;

still, S is too much R to be Q.

We should, however, note that there are similar statements, which do not inhibit a normally valid mood, but positively join sentences which would normally not be incompatible but merely unable to constitute a valid mood; for example:

While P is more R than Q and Q is too little R to be S;
yet, P is enough R to be S.

Finally, it should be clear that we can imagine more complicated cases, where the relation of the range R to S is not continuous, having gaps and/or being wholly or partly inverted. In such cases, the relations between P, Q, R, and S might be such that inferences are not possible, or at least not without access to some contorted formulae. We do not have, in ordinary language, stock phrases for such situations - in practice, if necessary, we switch to mathematical instruments.

b. We will call the form of argument so far considered[58], ***primary*** a-fortiori. Such arguments consist of a commensurative proposition as major premise and two suffective propositions as minor premise and conclusion. These forms imply, as we shall now see, a new class of arguments, a host of ***secondary*** a-fortiori, which consist of two suffectives as premises and a commensurative as conclusion. Here is how they are derived (we must, in this context, regard P and Q neutrally, without in advance saying which represents a larger or smaller quantity of R):

Let us, to begin with, take the following subjectal (merging two valid moods into a compound argument):

P is R more than *or* as much as Q (is R),
and Q is R enough to be S;
so, P is R enough to be S.

If we deny the conclusion and retain the minor premise, we obtain the denial of the major premise. Thus, the following secondary mood is valid:

Q is R enough to be S,
and **P *is R, but* not R enough to be S;**
whence, **P is less R than Q**
(i.e. P is R neither more than nor as much as Q).

[58] We have only thus far dealt with moods involving a positive major premise; those with a negative major premise are discussed further down.

Note well that the conclusion here proposed is only valid if it is a given that ‘P is R’. For, whereas the major premise guarantees that ‘Q is R’, if we express the minor premise merely as ‘P is not R enough to be S’ then that ‘P is not R’ remains a possibility, and the conclusion has to be a more indefinite negation of the major premise of the root primary argument (i.e. “**Not-**{P is R more than or as much as Q}”), since we have conceived of the form ‘P is less R than Q’ as implying that P is R, rather than (as we might have done) including ‘P is not R’ in it as a zero limit (i.e. viewing ‘NotR’ as equivalent to ‘R=0’).

Now, let us transpose the premises, call P ‘Q’ and Q ‘P’, and commute the conclusion - and we obtain the following valid secondary mood:

Q *is R, but* not R enough to be S,
and **P is R enough to be S**;
whence, **P is more R than Q**
(i.e. P is R neither as much as nor less than Q).

Note, these are analogous to second figure syllogisms (except that the conclusion would be ‘P is not Q’). Note also the need to be given that ‘Q is R’, as in the previous case.

Similarly, we can derive the predicatal moods by *ad absurdum* from the corresponding primaries; note that here the structure resembles third figure syllogism:

***Though some degree of R is required to be Q,* S is not R enough to be Q**,
and **S is R enough to be P**;
whence, **Less R is required to be P than to be Q**.

S is R enough to be Q,
and ***Though some degree of R is required to be P,* S is not R enough to be P**;
whence, **More R is required to be P than to be Q**.

Note well the need to specify in the premises that certain degrees of R are required to be Q or P (as the case may be); otherwise, the conclusion, whose form we have conceived as entailing that R both (as of Rp) implies P and (as of Rq) implies Q’, would have to be expressed as a broader negation, namely as “**Not-**{less R is required to be P than to be Q}”. Here, as everywhere, the conclusion must be fully guaranteed by the premises.

Furthermore, strictly-speaking, these two predicatal conclusions are more general than they ought to be. They are true *at least for cases of S*; assuming them to be true for more would be an unwarranted generalization; one can conceive that in cases other than S, the requirements of R, to be P or Q, are different. In primary a-fortiori, this issue does not arise, insofar as the commensurative proposition is major premise and implicitly given as general; but in secondary a-fortiori, i.e. here, the commensurative is a conclusion and must be carefully evaluated.

Note that in all valid secondaries, the suffective premises are of unequal polarity - this is what makes possible the drawing of a commensurative conclusion, which is never egalitarian.

> We may, furthermore, mention in passing the possibility of compound and variant secondary moods, such as the subjectal: 'P is R more than enough to be S; and Q is R less than enough to be S; therefore, P is more R than Q' (similarly, with P just enough and Q less than enough, or with P more than enough and Q just enough). Analogous predicatal: 'S is R less than enough to be P; and S is R more than enough to be Q; therefore, at least for cases of S, more R is required to be P than to be Q' (similarly, with less than enough for P and just enough for Q, or with just enough for P and more than enough for Q).

c. We will now consider the possibility of *primary* a-fortiori arguments with **major premise negative**. Such arguments may be shown, most readily, to be *invalid*, with reference to the secondary arguments which would be derivable from them (by reduction ad absurdum), were they to have been valid. Consider, for instance, the following secondary argument (subjectal) with both premises positive:

Q is R enough to be S,
and P is R enough to be S;
"whence," P is more R than Q.

The proposed conclusion obviously cannot follow from the premises, because the premises are identical in form for the terms P and Q, and therefore there is nothing to justify their distinction in the conclusion. This is equally true if we try 'P is less R than Q' as our conclusion, or the negation of either of these proposed conclusions. It is clear that these alternatives are, though non-sequiturs, still possible outcomes; and therefore the proposition 'P is as R as Q', or its negation, cannot be necessary conclusions, but likewise are merely possible alternatives. In short, there is no conclusion of the proposed kind with the given premises.

It follows that the primary arguments below, with a negative major premise (commensurative) and negative conclusion (suffective), cannot be valid, either. For if they were, then the secondary argument just considered would have to be valid, too. That is, whether we try major to minor or minor to major form, whether with a superior or inferior (shown in brackets) or egalitarian (similarly, though not shown below) major premise, all such moods are invalid:

P is not more (or: not less) R than Q,
and P is R enough to be S;
"whence," Q is not R enough to be S.

P is not more (or: not less) R than Q,
and Q is R enough to be S;
"whence," P is not R enough to be S.

Similarly for the corresponding predicatal arguments: the secondary mood given below is invalid:

S is R enough to be Q,
and S is R enough to be P;
"whence," More R is required to be P than to be Q.

Are invalid, as well, any other secondary mood with the same positive premises, and any other positive (or negative) conclusion of the same sort, such as 'Less R is required to be P than to be Q'. It follows that primary moods of the kind below are also invalid:

More (or: Less) R is not required to be P than to be Q,
and S is R enough to be P;
"whence," S is not R enough to be Q.

More (or: Less) R is not required to be P than to be Q,
and S is R enough to be Q;
"whence," S is not R enough to be P.

And this invalidity, naturally, extends to negative egalitarian arguments.

All this is very understandable, because the negative commensurative propositions, which are the major premises of these invalid primary arguments, are all relatively weak bonds between their terms. The situation is similar to that of first-figure categorical syllogism with a particular or possible major premise, or similarly hypothetical syllogism with a lower-case major premise. One can further explore this issue by translating all the propositions involved from their bulk forms into their pieces; negatives, remember, emerge as disjunctions of hypotheticals and comparatives.

d. We might also explore, in a thorough investigation of a-fortiori logic, other irregular forms of the argument. I have done this work, but will not include the results here so as not to overburden readers with relatively unimportant, often trivial, matters. I will just mention certain items as briefly as possible, for the record:

(i) **Negative terms/theses**, i.e. the appearance of NotP, NotQ, NotR and/or NotS, instead of P, Q, R, S, respectively, in propositions used in a-fortiori, do not in themselves affect the formal properties of the argument - provided they are repeated throughout it. Difficulties arise when combinations of a term/thesis and its negation appear in the same argument; in which case, the oppositional and eductive relations between the positive and the 'negativized' version of each proposition must be carefully studied (translating bulk forms into their pieces), and in particular the compatibility of the premises assured. This is not a problem particular to a-fortiori, but may be found in syllogistic logic. We might in principle hope to find certain

combinations of premises capable of yielding new valid moods. However, I can report that I have not found any, because *the conceivable premises are always incompatible with each other*. For example, given the premises:

P implies more *R* than Q implies (major),
and P implies *NotR* enough to imply S (minor),

we might at first sight think that, by educing from the original minor the following proposition (our effective minor premise):

P does *not* imply *R (i.e. NotNotR)* enough to imply S,

we could make a negative antecedental a-fortiori inference, and conclude at least that:

Q does *not* imply *R* enough to imply S

(notice that the inference is major to minor, and not minor to major, due to the inherent change of polarity); however, though the educed minor premise is compatible with the given major, the original minor itself is not, so that the whole exercise is futile (I include it here just for purposes of illustration). Similarly, for other atypical combinations of premises.

It may be that someone discovers valid derivative moods of this sort that I have not taken into consideration, but I doubt it. In any event, any encounter with cases of this kind should be treated with great care: they are tricky. Also, keep in mind that, ontologically, R and NotR, viewed as ranges, are very distinct, their values not having a general one-for-one correspondence. The denial of any given value of R (say, R1) is an indefinite affirmation (in disjunction) of all remaining values of R (R2, R3, etc.) *and* of all the values of NotR.

(ii) Negative Relationships. The positive forms can also be 'negativized' by *negating the relationship* they involve, i.e. putting 'is-not' in place of 'is' (for copulatives), or 'does not imply' in place of 'implies' (for implicationals). Some of the primary and secondary valid moods, already dealt with above, involved negative relationships; so that we have incidentally covered part of the ground. However, what interests us here is possible *divergences* between copulative and implicational arguments, mainly due to the fact that, whereas 'X is-not Y' is equivalent with 'X is NotY' (by obversion), 'X does-not-imply Y' is not interchangeable with 'X implies NotY' (but merely subaltern to it).

Copulative arguments of the sort under consideration are easy to validate, since we merely change predicate, positing a negative instead of negating a positive; for examples:

P is more R than Q,
and Q is R enough *not to be* S (= enough to be NotS);
so, P is R enough *not to be* S (= enough to be NotS).

More R is required *not to be* P (= to be NotP) than *not to be* Q (= to be NotQ),
and S implies R enough *not to be* P (= to be NotP);
so, S implies R enough *not to be* Q (= to be NotQ).

In contrast, in the corresponding implicational arguments (shown below), try as we might to apply the same analytical validation procedure as we used for other implicational arguments (translating bulk forms into their pieces), the proposed inferences are found to be illegitimate, because we cannot syllogistically derive the fourth piece needed to construct the concluding bulk form from the given data[59]:

P implies more R than Q implies;
and Q implies R enough *not to imply* S;
"so," P implies R enough *not to imply* S.

> The major premise entails: P implies Rp; Q implies Rq; Rp implies Rq. The minor premise entails: Q implies Rq; Rq implies Rs; Rs does-not-imply S; and Q does-not-imply S. With regard to the proposed conclusion: we can infer from the given premises that P implies Rp, Rp implies Rs, Rs does-not-imply S; but whether P implies or does-not-imply S remains problematic, so that we cannot infer that P implies R enough not to imply S (though note that if we were given as an additional premise that P does not imply S, we could infer the desired bulk conclusion).

More R is required *not to imply* P than *not to imply* Q;
and S implies R enough *not to imply* P;
"so," S implies R enough *not to imply* Q.

> The major premise entails: Rp does-not-imply P and Not(Rp) implies P; Rq does-not-imply Q and Not(Rq) implies Q; Rp implies Rq but Rq does not imply Rp. The minor premise entails: S implies Rs; Rs implies Rp; Rp does-not-imply P; and S does-not-imply P. With regard to the proposed conclusion: we can infer from the given premises that S implies Rs, Rs implies Rq, Rq does-not-imply Q; but whether S implies or does-not-imply Q remains problematic, so that we cannot infer that S implies R enough not to imply Q (though note that if we were given as an additional premise that S does not imply Q, we could infer the desired bulk conclusion).

What the above teaches us, effectively, is that we cannot treat the clause 'does not imply Y' as a conceptual unit, called 'Y1', say, and recast the form 'X implies R enough not-to-imply Y' into the form 'X implies R enough to imply Y1'. Such a artifice, known to logicians as *permutation*, is acceptable in some domains of logic, as in the case of obversion mentioned above; but in other domains, it has been found unacceptable, as for instances in modal logic (for the modality 'can') and in class logic (where it leads to the Russell Paradox). There is therefore no automatic guarantee that permutation is acceptable, in any given field, and we should not be surprised when, as in the present context, we discover its invalidity.

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59 Note that transposing the minor premise and conclusion would not improve matters; the result would remain inconclusive.

To sum up the research: implicational a-fortiori, whether antecedental or consequental, involving the negative relationships, were found **invalid**, using the above mentioned and other methods. The above samples are positive; but it follows that negative versions are equally invalid, since otherwise positive moods could be derived from them by *reductio ad absurdum*. The same results can be obtained with inferior and egalitarian major premises (even though in the latter case more data is implied). To be precise, I did not *prove* the various irregular a-fortiori arguments to be invalid, but rather did *not find any proof* that they are valid. It is not inconceivable that someone else finds conclusive paths of inference, but in the absence of such proof of validity, we must consider the proposed moods invalid.

These findings allow us to conclude that, *although the analogy between regular copulative and implicational arguments is very close, there are irregular cases where their properties diverge*, and copulatives are found valid while analogous implicationals are found invalid. They are significant findings, in that:

- they technically justify our initial separation of copulative and implicational a-fortiori into two distinct classes;
- they confirm, surprisingly, that our initial list of valid moods is pretty exhaustive (discounting obvious derivatives and variant subsets);
- and they confirm the general lesson of the science of logic that processes which prima facie might seem feasible, often turn out, upon closer inspection, to be illegitimate.

4. *QAL VACHOMER*.

In the previous chapter, we considered the formal, deductive aspects of a-fortiori argument. In the present chapter, we shall relate our findings to past Jewish studies in this field, and also consider certain more inductive and epistemological issues.

1. Background.

Jewish logic has long used and explicitly recognized a form of argument called ***qal vachomer*** (meaning, lenient and stringent). According to *Genesis Rabbah* (92:7, *Parashat Miqets*), an authoritative Midrashic work, there are ten samples of such of argument in the Tanakh: of which four occur in the Torah (which dates from the 13th century BCE, remember, according to Jewish tradition), and another six in the Nakh (which spreads over the next eight or so centuries). Countless more exercises of *qal vachomer* reasoning appear in the Talmud, usually signaled by use of the expression *kol sheken*. Hillel and Rabbi Ishmael ben Elisha include this heading in their respective lists of hermeneutic principles, and much has been written about it since then.

In English discourse, as we saw in the previous chapter, such arguments are called ***a-fortiori*** (***ratione***, Latin; meaning, with stronger reason) and are usually signaled by use of the expression *all the more.* The existence of a Latin, and then English, terminology suggests that Christian scholars, too, eventually found such argument worthy of study (influenced no doubt by the Rabbinical precedent)[60]. But what is rather interesting, is that modern secular treatises on formal logic all but completely ignore it - which suggests that no decisive progress was ever achieved in analyzing its precise morphology. Their understanding of a-fortiori argument is still today very sketchy; they are far from the formal clarity of syllogistic theory.

Witness for instance the example given in an otherwise quite decent *Dictionary of Philosophy*: “If all men are mortal, then *a fortiori* all Englishmen - who constitute a small class of all men - must also be mortal”. This is in fact not an example of a-fortiori argument, but merely of syllogism[61], showing that there is a misapprehension still today. Or again,

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60 There are already, in the Christian Bible, examples of a-fortiori, some of which are analyzed by H. Maccoby in *The Mythmaker: Paul and the Invention of Christianity.* The author mentions Paul's fondness for the argument, but shows him to have lacked knowledge of the *'dayo* principle' (see further on), concluding that his use of the form was more akin to the rhetoric of Hellenistic Stoic preachers (pp. 64-67).

61 It could be said that there is an a-fortiori movement of thought inherent in syllogism, inasmuch as we pass from a larger quantity (all) to a lesser (some). But in syllogism, the transition is made possible by means of the relatively incidental extension of the middle term, whereas, as we have seen, in a-fortiori proper, it is the range of values inherent to the middle term which make it possible.

consider the following brief entry in the *Encyclopedie Philosophique Universelle*[62]: "*A fortiori* argument rests on the following schema: x is y, whereas relatively to the issue at hand z is more than x, therefore a fortiori z is y. It is not a logically valid argument, since it depends not on the form but on the content *(Ed.)*". The skeptical evaluation made in this case is clearly only due to their inability to apprehend the exact formalities; yet the key is not far, concealed in the clause "relatively to the issue at hand". Many dictionaries and encyclopaedias do not even mention a-fortiori.[63]

> *Qal vachomer* logic was admittedly a hard nut to crack; it took me two or three weeks to break the code. The way I did it, was to painstakingly analyze a dozen concrete Biblical and Talmudic examples, trying out a great many symbolic representations, until I discerned all the factors involved in them. It was not clear, at first, whether all the arguments are structurally identical, or whether there are different varieties. When a few of the forms became transparent, the rest followed by the demands of symmetry. Validation procedures, formal limitations and derivative arguments could then be analyzed with relatively little difficulty. Although this work was largely independent and original, I am bound to recognize that it was preceded by considerable contributions by past Jewish logicians, and in celebration of this fact, illustrations given here will mainly be drawn from Judaic sources.

The formalities of a-fortiori logic are important, not only to people interested in Talmudic logic, but to logicians in general; for the function of the discipline of logic is to identify, study, and validate, all forms of human thought. And it should be evident with little reflection that we commonly use reasoning of this kind in our thinking and conversation; and indeed its essential message is well known and very important to modern science.

What seems obvious at the outset, is that a-fortiori logic is in some way concerned with the *quantitative* and not merely the qualitative description of phenomena. Aristotelian syllogism deals with attributes of various kinds, without effective reference to their *measures or degrees*; it serves to classify attributes in a hierarchy of species and genera, but it does not place these attributes in any intrinsically numerical relationships. The only "quantity" which concerns it, is the extrinsic count of the instances to which a given relationship applies (which makes a proposition general, singular or particular).

This is very interesting, because - as is well known to students of the history of science - modern science arose precisely through the growing awareness of quantitative issues. Before the Renaissance, measurement played a relatively minimal role in the physical sciences; things were observed (if at all) mainly with regard to their qualitative similarities and differences. Things were, say, classed as hot or cold, light or heavy, without much further precision. Modern science introduced physical instruments and mathematical tools, which enabled a more fine-tuned pursuit of knowledge in the physical realm.

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62 Vol. 1, p. 51, my translation.

63 I must report that near the end of writing this book, I uncovered a much better definition of a-fortiori argument by Lalande, in the *Vocabulaire technique et critique de la philosophie*. He writes (my translation): "Inference from one quantity to another quantity of similar nature, larger or smaller, and such that the first cannot be reached or passed without the second being [reached] also." Note, however, that this definition fails to specify that the positive movement from large to small is predicatal, while that from small to large is subjectal; and it ignores negative moods altogether, as well as differences between copulative and implicational forms. Lalande adds that the argument is of legal origin, quoting the Latin rule "*Non debet, cui plus licet, quod minus est non licere*" (p. 32).

A-fortiori argument may well constitute the formal bridge between these two methodological approaches. Its existence in antiquity, certainly in Biblical and Talmudic times, shows that quantitative analysis was not entirely absent from the thought processes of the precursors of modern science. They may have been relatively inaccurate in their measurements, their linguistic and logical equipment may have been inferior to that provided by mathematical equations, but they surely had some knowledge of quantitative issues.

In the way of a side note, I would like to here make some comments about the history of logic. Historians of logic must in general distinguish between several aspects of the issue.

(a) The ***art or practice*** of logic: as an act of the human mind, an insight into the relations between things or ideas, logic is part of the natural heritage of all human beings; it would be impossible for us to perform most of our daily tasks or to make decisions without some exercise of this conceptual power. I tend to believe that all forms of reasoning are natural; but it is not inconceivable that anthropologists demonstrate that such and such a form was more commonly practiced in one culture than any other[64], or first appeared in a certain time and place, or was totally absent in a certain civilization.

(b) The ***theoretical awareness and teaching*** of logic: at what point in history did human beings become self-conscious in their use of reasoning, and began to at least orally pass on their thoughts on the subject, is a moot question. Logic can be grasped and discussed in many ways; and not only by the formal-symbolic method, and not only in writing. Also, the question can be posed not only generally, but with regard to specific forms of argument. The question is by definition hard for historians to answer, to the extent that they can only rely on documentary evidence in forming judgments. But orally transmitted traditions or ancient legends may provide acceptable clues.

(c) The ***written science*** of Logic, as we know it: the documentary evidence (his written works, which are still almost totally extant) points to Aristotle (4th century BCE) as the first man who thought to use symbols in place of terms, for the purpose of analyzing various eductive and syllogistic arguments, involving the main forms of categorical proposition. Since then, the scope of formal logic has of course greatly broadened, thanks in large measure to Aristotle's admirable example, and findings have been systematized in manifold ways.

Some historians of logic seem to equate the subject exclusively with its third, most formal and literary, aspect (see, for instance, Windelband, or the *Encyclopaedia Britannica* article on the subject). But, even with reference only to Greek logic, this is a very limiting approach. Much use and discussion of logic preceded the Aristotelian breakthrough, according to the reports of later writers (including Aristotle). Thus, the Zeno paradoxes were a clear-minded use of Paradoxical logic (though not a theory concerning it). Or again, Socrates' discussions (reported by his student Plato) about the process of Definition may be classed as logic theorizing, though not of a formal kind.

Note that granting a-fortiori argument to be a natural movement of thought for human beings, and not a peculiarly Jewish phenomenon, it would not surprise me if documentary evidence of its use were found in Greek literature (which dates from the 5th century BCE) or its reported oral antecedents (since the 8th century); but, so far as I know, Greek logicians - including Aristotle - never developed a formal and systematic study of it.

The dogma of the Jewish faith that the hermeneutic principles were part of the oral traditions handed down to Moses at Sinai, together with the written Torah - is, in this perspective, quite conceivable. We must keep in mind, first, that the Torah is a complex document which could never be understood without the mental exercise of some logical intuitions. Second, a people who over a thousand years before the Greeks had a written

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64 I have an impression, for instance, that modern French discourse involves more use of a-fortiori than modern English discourse. To what extent that is true, and why it should be so, I cannot venture to say.

language, could well also have conceived or been given a set of logical guidelines, such as the hermeneutic principles. These were not, admittedly, logic theories as formal as Aristotle's; but they were still effective. They do not, it is true, appear to have been put in writing until Talmudic times; but that does not definitely prove that they were not in use and orally discussed long before.

With regard to the suggestion by some historians that the Rabbinic interest in logic was a result of a Greek cultural influence - one could equally argue the reverse, that the Greeks were awakened to the issues of logic by the Jews. The interactions of people always involve some give and take of information and methods; the question is only who gave what to whom and who got what from whom. The mere existence of a contact does not in itself answer that specific question; it can only be answered with reference to a wider context.[65]

A case in point, which serves to illustrate and prove our contention of the independence of Judaic logic, is precisely the *qal vachomer* argument. The Torah provides documentary evidence that this form of argument was at least *used* at the time it was written, indeed two centuries earlier (when the story of Joseph and his brothers, which it reports, took place). If we rely only on documentary evidence, the written report in Talmudic literature, the conscious and explicit *discussion* of such form of argument must be dated to at least the time of Hillel, and be regarded as a ground-breaking discovery. To my knowledge, the present study is the first ever thorough analysis of *qal vachomer* argument, using the Aristotelian method of symbolization of terms (or theses). The identification of the varieties of the argument, and of the significant differences between subjectal (or antecedental) and predicatal (or consequental) forms of it, seems also to be novel.

2. Samples in the Torah.

Our first job was to *formalize* a-fortiori arguments, to try and express them in symbolic terms, so as to abstract from their specific contents what it is that makes them seem "logical" to us. We needed to show that there are legitimate forms of such argument, which are not mere flourishes of rhetoric designed to cunningly mislead, but whose function is to guide the person(s) they are addressed to through genuinely inferential thought processes. This we have done in the previous chapter.[66]

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65 It is interesting to note in any case, that Josephus Flavius claims that a disciple of Aristotle, called Clearchus, wrote a book, which is no longer extant, in which he reports a meeting between Aristotle and a Jew, during which presumably ideas were exchanged. What ideas were exchanged, and whether this story is fact or legend, I do not know (see Bentwich).

66 I wish to make an acknowledgement at this stage. My special interest in a-fortiori argument was aroused back in 1990 by a Vancouver, B.C., lawyer, Mr. Daniel Goldsmith. I had written an article on "Jewish Logic" which was gradually published in a local Jewish paper called "*World of Chabad*". One reader, Mr. Goldsmith, wrote to me suggesting that I pay special attention to a-fortiori argument, as a form of reasoning which was particularly Jewish and which had not so far received much formal treatment. I resolved at the time to follow this suggestion, and the present essays on the subject are the result.

With regard to Hebrew terminology. The major, minor and middle terms are called: *chomer* (stringent), *qal* (lenient), and, supposedly, *emtsa'i* (intermediate). The general word for premise is *nadon* (that which legalizes; or *melamed*, that which teaches), and the word for conclusion is *din* (the legalized; or *lamed*, the taught). I do not know what the accepted differentiating names of the major and minor premises are in this language; I would suggest the major premise be called *nadon gadol* (great), and the minor premise *nadon katan* (small). Note also the expressions *michomer leqal* (from major to minor) and *miqal lechomer* (from minor to major).

I have noticed that the expression "*qal vachomer*" is sometimes used in a sense equivalent to "*kol sheken*" (all the more), and intended to refer to the minor premise and conclusion, respectively, whatever the value of the terms that these propositions involve (i.e. even if the former concerns the major term, and the latter concerns the minor term), because the conclusion always appears more 'forceful' than the minor premise. This usage could be misleading, and is best avoided.

Let us now, with reference to cogent examples, check and see how widely applicable our theory of the *qal vachomer* argument is thus far, or whether perhaps there are new lessons to be learnt. I will try and make the reasoning involved as transparent as possible, step by step. The reader will see here the beauty and utility of the symbolic method inaugurated by Aristotle.

Biblical a-fortiori arguments generally seem to consist of a minor premise and conclusion; they are presented without a major premise. They are worded in typically Jewish fashion, as a question: "this and that, how much more so and so?" The question mark (which is of course absent in written Biblical Hebrew, though presumably expressed in the tone of speech) here serves to signal that no other conclusion than the one suggested could be drawn; the rhetorical question is really "do you think that another conclusion could be drawn? no!"

Concerning the absence of a major premise, it is well known and accepted in logic theorizing that arguments are in practice not always fully explicit (*meforash*, in Hebrew); either one of the premises and/or the conclusion may be left tacit (*satum*, in Hebrew). This was known to Aristotle, and did not prevent him from developing his theory of the syllogism. We naturally tend to suppress parts of our discourse to avoid stating "the obvious" or making tiresome repetitions; we consider that the context makes clear what we intend. Such incomplete arguments, by the way, are known as *enthymemes* (the word is of Greek origin).

The missing major premise is, in effect, *latent* in the given minor premise and conclusion; for, granting that they are intended in the way of an argument, rather than merely a statement of fact combined with an independent question, it is easy for any reasonably intelligent person to *construct* the missing major premise, if only subconsciously. If the middle term is already explicit in the original text, this process is relatively simple. In some cases, however, no middle term is immediately apparent, and we must provide one (however intangible) which verifies the argument.

In such case, we examine the given major and minor terms, and abstract from them a concept, which seems to be their common factor. To constitute an appropriate middle term, this underlying concept must be such that it provides a quantitative continuum along which the major and minor terms may be placed. Effectively, we syllogistically substitute two degrees of the postulated middle term, for the received extreme terms. Note that a similar operation is sometimes required, to standardize a subsidiary term which is somewhat disparate in the original minor premise and conclusion.

We are logically free to volunteer any credible middle term; in practice, we often do not even bother to explicitly do so, but just take for granted that one exists. Of course, this

does not mean that the matter is entirely arbitrary. In some cases, there may in fact be no appropriate middle term; in which case, the argument is simply fallacious (since it lacks a major premise). But normally, no valid middle term is explicitly provided, on the understanding that one is easy to find - there may indeed be many obvious alternatives to choose from (and this is what gives the selection process a certain liberty).

(1) Let us begin our analysis with a Biblical sample of the simplest form of *qal vachomer*, subjectal in structure and of positive polarity. It is the third occurrence of the argument in the *Chumash*, or Pentateuch (**Numbers, 12:14**). God has just struck Miriam with a sort of leprosy for speaking against her brother, Moses; the latter beseeches God to heal her; and God answers:

> *If her father had but spit in her face, should she not hide in shame seven days? let her be shut up without the camp seven days, and after that she shall be brought in again.*

If we reword the argument in standard form, and make explicit what seems to be tacit, we obtain the following.

Major premise:

> "Divine disapproval (here expressed by the punishment of leprosy)" (=P) is more "serious disapproval" (=R) than "paternal disapproval (signified by a spit in the face)" (=Q);

Minor premise:

> if paternal disapproval (Q) is serious (R) enough to "cause one to be in isolation (hide) in shame for seven days" (=S),

Conclusion:

> then Divine disapproval (P) is serious (R) enough to "cause one to be in isolation (be shut up) in shame for seven days" (=S).

Note that the middle term (seriousness of disapproval) was not explicit, but was conceived as the common feature of the given minor term (father's spitting in the face) and major term (God afflicting with leprosy). Concerning the subsidiary term these propositions have in common, note that it is not exactly identical in the two original sentences; we made it uniform by replacing the differentia (hiding and being shut up) with their commonalty (being in isolation). More will be said about the specification "for seven days" in the subsidiary term (S), later.

(2) A good Biblical sample of negative subjectal *qal vachomer* is that in **Exodus, 6:12** (it is the second in the Pentateuch). God tells Moses to go back to Pharaoh, and demand the release of the children of Israel; Moses replies:

Behold, the children of Israel have not hearkened unto me; how then shall Pharaoh hear me, who am of uncircumcised lips?

This argument may be may be construed to have run as follows:

Major premise:

The children of Israel (=P) "fear God" (=R) more than Pharaoh (=Q) does;

Minor premise:

yet, they (P) did not fear God (R) enough to hearken unto Moses (=S);

Conclusion:

all the more, Pharaoh (Q) will not fear God (R) enough to hear Moses (S).

Here again, we were only originally provided with a minor premise and conclusion; but their structural significance (two subjects, a common predicate) and polarity were immediately clear. The major premise, however, had to be constructed; we used a middle term which seemed appropriate - "fear of God".

Concerning our choice of middle term. The interjection by Moses, "I am of uncircumcised lips", which refers to his speech problem (he stuttered), does not seem to be the intermediary we needed, for the simple reason that this quality does not differ in degree in the two cases at hand (unless we consider that Moses expected to stutter more with Pharaoh than he did with the children of Israel). Moses' reference to a speech problem seems to be incidental - a rather lame excuse, motivated by his characteristic humility - since we know that his brother Aaron acted as his mouthpiece in such encounters.

In any case, note in passing that the implicit intent of Moses' argument was to dissuade God from sending him on a mission. Thus, an additional argument is involved here, namely: "since Pharaoh will not hear me, there is no utility in my going to him" - but this is not a *qal vachomer*.

(3) The first occurrence of *qal vachomer* in the Torah - and perhaps historically, in any extant written document - is to be found in **Genesis, 44:8** (it thus dates from the Patriarchal period, note). It is a positive predicatal a-fortiori. Joseph's brothers are accused by his steward of stealing a silver goblet, and they retort:

Behold, the money, which we found in our sacks' mouths, we brought back unto thee out of the land of Canaan; how then should we steal out of thy lord's house silver or gold?

According to our theory, the argument ran as follows:

Major premise:

You will agree to the general principle that more "honesty" (=R) is required to return found money (=P) than to refrain from stealing a silver goblet (=Q);

Minor premise:

and yet, we (=S) were honest (R) enough to return found money (P);

Conclusion:

therefore, you can be sure that we (S) were honest (R) enough to not-steal the silver goblet (Q).

Here again, the middle term (honesty) was only implicit in the original text. The major premise may be true because the amount of money involved was greater than the value of the silver goblet, or because the money was found (and might therefore be kept on the principle of "finders keepers") whereas the goblet was stolen; or because the positive act of returning something is superior to a mere restraint from stealing something.

(4) There is no example of negative predicatal a-fortiori in the Torah; but I will recast the argument in **Deuteronomy, 31:27**, so as to illustrate this form. The original argument is in fact positive predicatal in form, and it is the fourth and last example of *qal vachomer* in the Pentateuch:

> *For I know thy rebellion, and thy stiff neck; behold, while I am yet alive with you this day, ye have been rebellious against the Lord; and how much more after my death?*

We may reword it as follows, for our purpose:

Major premise:

More "self-discipline" (=R) is required to obey God in the absence of His emissary, Moses (=P), than in his presence (=Q);

Minor premise:

the children of Israel (=S) were not sufficiently self-disciplined (R) to obey God during Moses' life (Q);

Conclusion:

therefore, they (S) would surely lack the necessary self-discipline (R) after his death (P).

In this case, note, the middle term was effectively given in the text; "self-discipline" is merely the contrary of disobedience, which is implied by "stiff neck and rebelliousness". The constructed major premise is common sense.

We have thus illustrated all four moods of copulative *qal vachomer* argument, with the four cases found in the Torah. For the record, I will now briefly classify the six cases which according to the Midrash occur in the other books of the Bible. The reader should look these up, and try and construct a detailed version of each argument, in the way of an exercise. In every case, the major premise is tacit, and must be made up.

Samuel I, 23:3. This is a positive antecedental.

Jeremiah, 12:5. This is a positive antecedental (in fact, there are two arguments with the same thrust, here).

Ezekiel, 15:5. This is a negative subjectal.

Proverbs, 11:31. This is a positive subjectal.

Esther, 9:12. This is a positive antecedental (if at all an a-fortiori, see discussion in a later chapter).

The following is a quick and easy **way to classify** any Biblical example of *qal vachomer*:

(a) What is the polarity of the given sentences? If they are positive, the argument is a *modus ponens*; if negative, the argument is a *modus tollens*.

(b) Which of the sentences contains the major term, and which the minor term? If the minor premise has the greater extreme and the conclusion has the lesser extreme, the argument is *a majori ad minus*; in the reverse case, it is *a minori ad majus*.

(c) Now, combine the answers to the two previous questions: if the argument is positive and minor to major, or negative and major to minor, it is subjectal or antecedental; if the argument is positive and major to minor, or negative and minor to major, it is predicatal or consequental.

(d) Lastly, decide by closer scrutiny, or trial and error, whether the argument is specifically copulative or implicational. At this stage, one is already constructing a major premise.

I will here only give one example of the more complex, implicational form of *qal vachomer*. It is described in the Encyclopaedia Judaica (8:367), as follows: "It is stated in Deuteronomy 21:23 that the corpse of a criminal executed by the court must not be left on the gibbet overnight, which R. Meir takes to mean that God is distressed by the criminal's death. Hence, R. Meir argues:... (Sanh. 6:5)."

> *If God is troubled at the shedding of the blood of the ungodly, how much more at the blood of the righteous!*

This is evidently a positive antecedental argument; verbalized more fully, it would be stated as follows:

<u>Major premise:</u>

> "The shedding of the blood of the righteous" (=P) is generally more "troubling" (=R) than "the shedding of the blood of the ungodly" (=Q);

<u>Minor premise:</u>

> if "the blood of the ungodly is shed" (P), then God is to some extent "troubled" (R), specifically to the extent of enacting the law in Deuteronomy 21:23 (=S);

Conclusion:

therefore, if "the blood of the righteous is shed" (Q), then God is to some extent "troubled" (R), to an extent not here specified but at least similar to the previous (S).

The middle term (trouble) is in this case given in the original text. It is not expressed identically in the major premise (troubling) and the other propositions (troubled), but this is a turn of language which is easily remedied. The major premise could have been expressed more elliptically as "P implies, for any subject, that he will be troubled, more than Q implies". Note the absence of an explicit consequent (subsidiary thesis) in the conclusion, and our use of the clause "to some extent"; more will we said about this later.

We will have occasion to discuss other examples of implicational *qal vachomer*, drawn from the Gemara, in a later section.

3. The *Dayo* Principle.

Rabbinical logicians raised an important question in relation to certain *qal vachomer* arguments. For instance, in the argument about Miriam (which we analyzed in the previous section), the minor premise posits a punishment of seven days for a relatively lesser crime, and the conclusion likewise posits a punishment of seven days for a relatively greater crime. Why only seven days? they wondered; should not the punishment be more, *proportionately* to the severity of the crime? A reasonable question.

Since the sample argument is of Divine origin, some Rabbis postulated that it suggests a universal logical rule, namely that the conclusion of a *qal vachomer* can never go further than the minor premise, in the specification of the measure or degree of the terms involved[67]. They called this, the ***dayo*** (**sufficiency**) principle (see *Baba Qama*, 2:5). Other Rabbis, like R. Tarphon (in *Baba Qama*, 25a), did not concur, but regarded a proportionate inference as permissible, at least in some cases. For my part, I would like to say the following.

In the argument concerning Miriam, it can easily be countered that God sentenced her in the conclusion to only seven days incarceration out of sheer mercy, though she might have been strictly-speaking subject to infinitely more; and that in any case, the seven days mentioned in the minor premise are not known through natural human insight, but equally through Divine fiat. Thus, this example does not by itself resolve the issue incontrovertibly.

If we compare, for instance, the argument made by R. Meir (also previously mentioned), we see that going beyond the given quantity is intuitively quite reasonable. Here, the minor premise is that God is (to some unspecified degree) troubled by the blood of a criminal, but the intended conclusion is that He is troubled even more (to a greater, though also unspecified degree) by the blood of an innocent. It has to be so, because the concrete expression of the distress of God, in the first case, is that the court must remove the criminal's corpse before nightfall; the implied obligation, in the second case, cannot be the same, since

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[67] The principle is stated as *din leba min hadin lihiot benadon.* Note that *J.E.* translates this as "the conclusion of an argument is satisfied when it is like the major premise"; but what they mean by 'major premise' is what we here, more precisely, name 'minor premise'.

the court would not execute an innocent - it is rather a general prescription that good people be treated still better than bad people.

Note, however, that in both our examples, the quantitative factor at issue may be made to stand somewhat outside the regular terms of the a-fortiori argument as such. In both cases, it is not the quantitative difference between the major and minor terms which is at issue; that is already given (or taken for granted) in the major premise. What is at issue is a quantitative evaluation of the remaining terms, the middle term and the subsidiary term, as they appear in the minor premise and conclusion.

According to our theory, the outward uniformity of these terms in those propositions is a formal feature of a-fortiori argument. But this feature does not in itself exclude variety at a deeper level. Such specific differences are side-issues which the a-fortiori argument itself cannot prejudge. It takes supplementary propositions, in a separate argument, which is not a-fortiori but purely mathematical in form, to make inferences about the precise quantitative ramifications of the a-fortiori conclusion.

Thus, we may acknowledge the *dayo* principle as correct, provided it is understood as being a minimal position. It does not insist on the quantitative equality of the subsidiary or middle term (as the case may be) in the conclusion and minor premise, nor does it interdict an inequality; it merely leaves the matter open for further research. A-fortiori argument *per se* does not answer the question; it is from a formal point of view as compatible with equality as with inequality. To answer the question, additional information and other arguments must be sought. This is a reasonable solution.

Generally speaking, what is needed ideally is some mathematical formula which captures the *concomitant variation* between a term external to the a-fortiori argument as such (e.g. amount of punishment), and a term of variable value implicit in the a-fortiori (e.g. severity of the sin). This formula then stands as the major premise in a distinct argument, whose minor premise and conclusion contain the indefinite term at issue in the a-fortiori argument (the middle or subsidiary term, as the case may be, to repeat) as their common subject, and the said external term's values as their respective predicates.

There is no guarantee, note well, that the variation in the major premise will be an arithmetical proportionality; it could just as well be an inverse proportionality or a much more complex mathematical relationship, even one involving other variables. This is why the a-fortiori argument as such cannot predict the result; its premises lack the information required for a more refined conclusion. In some cases, the concomitance is simple and well known, and for this reason seems to be an integral part of the a-fortiori; but this is an illusion, the proof being that it does not always work, and in more complex cases a separate judgment must be made.

Let us now analyze the issue underlying the *dayo* principle in more formal terms. Consider a positive subjectal a-fortiori, whose subsidiary term (S) is a conjunction of two factors, a constant (say, K) and a variable (say, V); and suppose V is a function (*f*) of the middle term (R), i.e. that V = *f*(R) in mathematical language. On a superficial level, the argument is simply as follows:

P is more R than Q,
and, Q is R enough to be S;
therefore, P is R enough to be S.

But "R enough" is a threshold, it is not a fixed quantity. In the case of the minor premise, involving Q, the value of R is Rq, say; whereas, in the case of the conclusion, involving P, the value of R is Rp, say; and we know from the major premise that Rp is greater than Rq. Looking now at S, it is evident that if it consists only of a constant (K), it will be identical in the minor premise and the conclusion. But, if S involves a variable V, where V is a function of R, then S is not necessarily exactly the same in both propositions. If V = *f*(R) represents a straightforward linear relationship, then Vp = *f*(Rp) will predictably be proportionately greater than Vq = *f*(Rq); but if V = *f*(R) represents a more complicated relationship, then Vp = *f*(Rp) may be more or less than Vq = *f*(Rq), or equal to it, depending on the specifics of the formula.

Similar comments can be made with regard to the other valid moods of *qal vachomer*. Note in any case that all this is well and good in principle; but *in practice*, we may not be able to provide an appropriate and accurate mathematical equation. Some phenomena are difficult and even impossible to measure; we may know that they somehow vary, but we may have no instruments with which to determine the variations, precisely or at all.

> The physical sciences acquired enormous prestige, because they concentrated their efforts on accessible phenomena (at least until the advent of sub-atomic physics, where according to the Heisenberg Principle precise determinations become in principle impossible, in view of the influence of available experimental means on the matter observed). Measurement is currently more difficult in biological or psychological contexts. In the still more abstract realm of ethical and legal discussions, not to mention purely spiritual issues, objective means are well-nigh non-existent, and we have to refer to Biblical hints or intuitive conventions to establish scales.
>
> Nevertheless, if that is a consolation, what is of interest to us here is the essential similarity *in principle* - with regard to the formal logic involved - between all human endeavors in the pursuit of knowledge. The proverbial superiority of modern physical sciences, in view of their powers of measurement, is relative and incidental. Their epistemological tools are no different than those of any other discipline. Other disciplines may be equally "scientific", in the root sense of the word, which refers to knowledge acquired through the strictest methodology; they are not totally incapacitated by the strictures which their peculiar subject-matter imposes on them.
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> The subject-matter of physics is relatively easy of access, so that it can measure more and achieve greater precision; other domains are progressively more difficult to deal with, and so the (in the widest sense) scientific endeavors which concern them are bound to be accordingly limited. But the requirements of objectivity of attitude, open-mindedness to new data, carefulness in reasoning, and honesty, are the same throughout; and this is what counts in evaluating any body of knowledge.

4. Objections!

The formalization of a-fortiori argument has been found difficult by past logicians for various reasons. (a) The complexity and variety of the propositional forms involved. (b) There are many varieties of the argument. (c) Known samples are usually incompletely formulated.

(d) Known samples often intertwine a mixture of purely a-fortiori and other forms of deductive inference. (e) The deductive and inductive issues were not adequately separated. We will clarify these matters in the present section.

Thus far, our goal has been to discover the essential form(s) of a-fortiori argument. We found the various kinds of premises and conclusion which ideally constitute such movements of thought. As in all formal logic, the conclusion *follows from* the premises; if the premises are true, then the conclusion is true. The presentation of a form of argument as valid does not in itself guarantee the truth of the premises. If any or all of the premises are not true, then the conclusion does not follow; the conclusion may happen to be false too, or it may be true for other reasons, but it is in any case a *non sequitur*.

This understanding of the relationship of premises and conclusion is not a special dispensation granted to our theory of a-fortiori, but applies equally well to all inference, be it eductive, syllogistic or otherwise deductive, or even inductive. In all cases, the question arises: ***how are the premises themselves known?*** And the answer is always: by any of the means legitimatized by the science of logic. A premise may be derived from experience by inductive arguments of various kinds, or be a logical axiom in the sense that their contradictories are self-denying, or even be Divinely revealed; or it may be deductively inferred in one way or another from such relatively primary propositions (whether they are *a posteriori* or *a priori*, to use the language of philosophers).

This issue has been acknowledged in the literature on Talmudic logic, through the doctrine of ***objection*** (in Hebrew, ***teshuvah***; in Aramaic, ***pirka***). A given a-fortiori argument, indeed any argument, may be criticized on formal grounds, if it is shown not to constitute a valid mood of reasoning. But it may also be objected to on material grounds, by demonstrating one or both of its premises is/are wholly or partly false, or at least open to serious doubt. The deduction as such may be valid, but its inductive backing (in the widest sense) may be open to doubt.

Consider for examples the Biblical samples of *qal vachomer* we have used as our illustrations.

In the argument concerning Miriam, we were given two sentences, neither of which is in itself obvious. Assuming that the Biblical verse as a whole is indeed intended as an argument, and not as two unrelated assertions, we may regard the first as a Divinely guaranteed truth and use it as our minor premise, but the second must somehow emerge as a conclusion. However, the major premise, which we ourselves construct to complete the argument, is in principle not indubitable. The one we postulated happens to seem reasonable (i.e. appears to be consistent with the rest of our knowledge); but it is conceivable that some objection could eventually be raised concerning it (say, that God attaches more importance to sins against parents than to sins against Himself).

In the next argument, by Moses, the major and minor premises are both known by empirical means. The former is a generalization, based on the past behavior patterns of the children of Israel and Pharaoh; and the latter is a statement concerning more recent events. These propositions happen to be true, so that the conclusion is justified, but they might conceivably have been factually inaccurate, in which case an objection could have been raised.

The argument made by Joseph's brothers is much more open to debate. The steward might have argued that they returned the money they found out of some motive(s) other than

the sheer compulsion of their honest natures: (a) to liberate their brother Simeon, which had been kept hostage (see Genesis, 42:24 and 43:23); or (b) because the famine in Canaan forced them to come back to Egypt (see 43:1); or even (c) because they feared eventual pursuit and retaliation; or simply (d) because the silver cup, being a tool for divining purposes, had more value than the sacks full of money, and thus tempted them to take more risks.

We accept the brothers' argument, because we believe that their honesty proceeded from their exceptional fear of God (irrespective of any more down to earth concerns), but it is not unassailable. Clearly, the empirical foundations of the major premise are rather complex, and an additional complication is the rather abstract psycho-ethical concept (namely, honesty) it involves. With regard to the minor premise, about the restitution of money - that was a straightforward observation of a singular physical event. In any case, this example well illustrates the inductive issues which may underlie an a-fortiori argument.

In the case of the argument by Moses concerning the stiff-neck and rebellion of the children of Israel, the major premise might be construed as a generalization from common experience. We know that children are less well behaved in the presence of their parents or school-teachers than in their absence, and similarly that people follow their leaders more strictly when their leaders' backs are not turned - and on this basis, the postulated major premise seems reasonable. But it might well be argued that though this is more often than not true, it is not always true (the children of Israel are indeed requested by Moses to make it untrue!) - and thus put the whole argument in doubt, or at least make it probable rather than necessary. As for the minor premise, it could be viewed as an overly severe evaluation of the behavior of the children of Israel - there is a subjective aspect to it.

Similar comments can be made with respect to Rabbi Meir's argument, demonstrating its possible weaknesses. We need not belabor the matter further. All this goes to prove, *not* as some logicians have claimed that a-fortiori argument is in principle without formal validity, but that it is often difficult to find solid material grounds for its effective exercise. It is thus understandable why Rabbinical legislators have usually regarded *qal vachomer* arguments as insufficient in themselves to justify a law, *unless supported by the authority of tradition*.

I would like now, in the way of a final illustration and test of our theory, to analyze an a-fortiori argument given in the Encyclopaedia Judaica[68]. It is drawn from the Talmud (*Chulin* 24a), which bases the argument on certain passages of the Torah (Leviticus, 21:16-21; and Numbers, 8:24-25). The argument seems complicated, but it is simply, as we shall see, positive antecedental in form; I quote:

> *If priests who are not disqualified for service in the Temple by age, are disqualified by bodily blemishes; then Levites, who are disqualified by age, should certainly be disqualified by bodily blemishes.*

The clue to a solution is in *the verb* involved; we notice that the central issue under discussion is the threshold of disqualification from Temple service. Our middle term (R), then, must be a concept with many different degrees (say, "unfitness"), such that there is a cut-off

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68 8:367.

point along it, which signifies the occurrence of disqualification; this is effectively the subsidiary term (S), which will be the consequent of our minor premise and conclusion.

Major premise:

> "Having bodily blemishes" (=P) implies more "unfitness for Temple service" (=R) than "being past a certain age" (=Q);

Minor premise:

> if a Levite reaches that age (Q), he is sufficiently unfit (R) that "he is disqualified" (=S);

Conclusion:

> therefore, all the more, if a Levite has bodily blemishes (P), he is sufficiently unfit (R) to be disqualified (S).

Note that the antecedents of the minor premise and conclusion, respectively, contain the minor and major terms, which cause the requisite degree of unfitness for disqualification. We see that this argument is identical in form to that of R. Meir, which we previously analyzed. What distinguishes it, however, is the way we construct the major premise. In the R. Meir argument, no explicit source is given for the major premise; but in the present example, we do have some additional data with which to justify our major premise.

The a-fortiori argument *as such* makes no mention of the priests; it only concerns the Levites. The logical utility of the statements in the original text about priests, is to serve as a springboard from which we can leap to the needed major premise. The two propositions "priests are not disqualified by old age" and "priests are disqualified by bodily blemishes", provide us with the Scriptural grounds for an inductive generalization to the proposition "Bodily blemishes more easily disqualify than old age", which in turn becomes our major premise.

An argument by analogy is involved, when we move from the case of priests, to all cases (all Temple servers), including eventually the case of Levites. This argument is not formally unassailable; the Torah might well have made a fine distinction, and allowed Levites with bodily blemishes to serve in the Temple (in view of their distinctive functions there). Two subjects can always have opposite predicates, without doing violence to logic. However, *since the Torah does not in fact make such a distinction*, we may reasonably generalize as the Rabbis did.

Thus, to summarize, not all of the Talmudic passage under discussion constituted an a-fortiori argument. The first section, concerning priests, *was not an inherent part of the qal vachomer inference per se, but served as the premise of a preliminary inductive argument* (namely, a generalization) which established the major premise of the *qal vachomer* as such. Only the second section, about Levites, belongs within the *qal vachomer* process proper.[69]

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[69] We can now mention the Rabbinical theory that the *dayo* principle has subdivisions, and may be applied either 'to the lenient case' or 'to the strict case'. This idea was based on a limited comprehension of a-fortiori argument, due precisely to the Rabbis' failure to distinguish between the deductive process itself and its inductive precedents. An example provided by Bergman (p. 128) is the following "If *shen* and *regel*, which cause no liability when committed on public property, nevertheless give rise to full liability if committed on the injured party's property, then *keren*, for which there is [half]

In this context, I would like to criticize and reject the theory of *qal vachomer* arguments proposed by the author, L. Jacobs (presumably), of the aforementioned Encyclopaedia Judaica article. He rightly (together with Kunst) dismisses the claim by some researchers (notably, A. Schwartz), that they may be identified with syllogistic reasoning; for the latter serve only the eventual purposes of subsumption of individuals in classes, or classes in classes-of-classes. However, Jacobs' own analysis of the topic is also faulty.

Jacobs' effort at formalization is not only an inadequate oversimplification, but also contrary to reason. He claims that the (above mentioned) argument of R. Meir (which he labels "simple") can be formalized as "if A has x, then certainly B has x"; but this explains nothing, it does not tell us why the inference is at all possible, because it is too vague. Similarly, he formalizes the argument about the priests and Levites (which he contrasts as "complex") as follows: "if A, which lacks y, has x, then B, which has y, certainly has x"; but this is absurd! The arrow is pointing in opposite directions in the antecedents (in one case against y, in the other case towards y), and then it flips over and points in the same direction in the consequents (toward x)!

Clearly, more precise formal tools, more careful logic and more perspicacious linguistic analyses, were needed to solve the mystery of *qal vachomer*. I believe that the theory I have proposed offers a definitive solution.

5. Rabbinic Formulations.

An important test of our general forms of *qal vachomer*, is their applicability to **the formulation of a-fortiori argument traditionally made in the Rabbinic literature**. Some logicians, like R. Luzatto (also known as the Ramchal), have a pretty large concept of *qal vachomer*, which includes any kind of scale of comparison as the effective middle term[70]. However, most authors seem to limit their concept to one specific kind of middle term, namely the concept of 'legal restriction'. Thus, for instance, R. Chavel[71] describes the argument as follows:

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liability if it occurred on public property, certainly should cause *full* liability if committed on the property of the injured party" (*B.Q.*, 25a): on the basis of the *dayo* principle, one cannot so argue, he says, but must conclude on *half* liability, for *keren* on private property, i.e. no more than *keren* invokes on public property. I agree with his conclusion, but for other reasons: we have 3 *givens*: (1) relatively unintentional damages by animals (*shen* and *regel*) in the public domain imply owner's liability to pay none of the damages; whereas, (2) the same on private property imply his liability to pay all of the damages; and (3) relatively intentional damages by animals (*keren*) in the public domain imply liability to pay half of the damages. The first two givens serve to induce the major premise of our actual a-fortiori: make the comparison 'for unintentional acts, acts committed on private property imply more liability than those committed in the public domain', then generalize to 'for all acts, the same', then educe the new particular 'for intentional acts, the same'. This result, combined with the third given, which serves as minor premise, form the a-fortiori argument proper, whose conclusion is 'intentional acts on private property imply liability to pay half the damages'. The application of the *dayo* principle involved in this last stage (subsidiary term: 'having to pay half damages') is perfectly regular, and requires no special new division, note well.

[70] We might also mention a description proposed by Maccoby, "if something is known about one thing which has a certain quality in relatively 'light' form, then it must be true 'all the more so' of some other thing that has the same quality in a relatively 'heavy' form". This description is incomplete in various ways, but at least does not limit itself to legal issues.

[71] P. 27, n. 106.

> *A form of reasoning by which a certain stricture applying to a minor matter is established as applying all the more to a major matter. Conversely, if a certain leniency applies to a major matter, it must apply all the more to the minor matter.*

R. Feigenbaum's description[72] is even clearer, as the following quotation shows. (Note that we are effectively dealing with a scale of modality, and with nesting of modalities within modalities.)

> *a) Any stringent ruling with regard to the lenient issue must be true of the stringent issue as well;*
> *b) any lenient ruling regarding the stringent issue must be true with regard to the lenient matter as well.*

These special formulations are easily assimilated by our general theory of *qal vachomer* argument, as follows:

a) P generally implies more 'stringency for the practitioner' (=R) than Q implies,
nonetheless, Q is stringent (R) enough to imply 'the practitioner subject to a certain restriction (or not-subject to a certain liberty)' (=S),
all the more, P is stringent (R) enough for this same ruling to apply (S).

b) P generally implies more 'stringency for the practitioner' (=R) than Q implies,
nonetheless, P is *not* stringent (R) enough to imply 'the practitioner subject to a certain restriction (or not-subject to a certain liberty)' (=S),
all the more, Q is *not* stringent (R) enough for this same ruling to apply (S).

Note that both arguments are antecedental in form, and one is expressed positively and the other negatively. The extreme theses (P, Q) are legal rulings; their middle thesis (R) is the magnitude of burden, let us say[73], they impose on a practitioner, and their subsidiary thesis (S) is a third legal clause, itself evaluated as burdensome to a certain degree. If the smaller burden (Rq) includes the subsidiary (Rs), then so does the larger (Rp); and by contraposition, if the greater burden excludes the subsidiary, then so does the lesser. Note, for the sake of symmetry, that we could conceive of similar formulas in which the middle thesis (R) is 'leniency for the

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72 P. 88.

73 The indefinition and apparent subjectivity of the concepts of 'lenient' and 'stringent' (or synonyms to the same effect) is important to note. They seem to refer to subjective/emotional reactions to laws; i.e. whether a law is felt by people as a further hardship or as a release from duty. If we suppose more formal definitions (see ch. 13), and regard every law - positive or negative, i.e. an imperative or a prohibition - as "stringent", and every absence of law - i.e. ethical contingency, permission and exemption - as a "leniency", then we must be very careful in this context, as modal logic is involved, which has special syllogistic behaviour-patterns (notably, one cannot draw a conclusion from a first-figure major premise which is not positively or negatively necessary). This matter requires further study, in relation to Rabbinical formulations of a-fortiori argument concerning "leniency".

practitioner', provided the subsidiary thesis (S) likewise changes in polarity, becoming 'the practitioner is subject to a certain liberty (or not-subject to a certain restriction)'.

Such formulas may be objected to, firstly, on the ground of their limited concept: they are conceived specifically in relation to the severity or laxity of ethical propositions (legal rulings, in Rabbinical terminology[74]), whereas a-fortiori is a much wider process, applicable to non-ethical propositions. Secondly, and more radically, these formulas involve a middle thesis ('burdensomeness', say) *too vague and diffuse* to enable a sure conclusion: the major premise must be *general*, and such generality can only be known by generalization or enumeration. If by generalization, the conclusion is at best probable; if by enumeration, we are begging the question (i.e. we had to know the desired conclusion beforehand).

For a law P may be burdensome in many respects and another law Q may be burdensome in many respects, and P may well be burdensome in numerically more respects than Q is burdensome; *even so*, the burdens of P may or may not include all the burdens of Q, and indeed the burdens of P and Q may not overlap at all! In other words, in principle (i.e. formally), the inference is not necessary without further specifications which somehow guarantee that the burdens of P include all those of Q. That is, the laws under discussion here, P and Q, have certain implicit material relations which must be brought out into the open.

Thus the above mentioned Rabbinical formulations of a-fortiori argument, are not only limited in scope (to ethical theses), but they cannot be considered as having formal validity (i.e. invariably guarantee inference). They are at best broad guidelines, which may occasionally be found inapplicable. Indeed, the Rabbis were aware of this problem, and did occasionally object to attempted such inferences by one of their colleagues, and claim that a stringency of Q did not necessarily apply to P or a leniency of P did not necessarily apply to Q. Effectively, they invalidated the major premise, denying it to be general and making it at best probable, by apposition of an acknowledged exception; and by this means, they inhibited application of *qal vachomer* reasoning to S, the new case under consideration.

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[74] Perhaps a word should be said about this difference in terminology. In philosophy, a distinction is made between ethical and legal propositions as follows. Ethics is the broader concept, which includes law. Law refers specifically to ethical propositions enforced by society (or the ruling segment thereof); some ethical propositions are not considered so enforceable (though supposedly inferred from nature). The Rabbis are clearly aware of this functional distinction, but tend to regard all ethical propositions as "laws", because they view them as ultimately enforced by God if not by society.

5. REVISED LIST OF BIBLICAL *A-FORTIORI*.

This chapter should be of interest to Bible scholars and students, rather than to secular logicians.

1. Problems Encountered.

We stated earlier that, according to *Genesis Rabbah*, there are ten cases of a-fortiori argument in the Bible: four of them in the Books of Moses and the other six in various other locations. This Midrashic work is traditionally said to have been compiled either by Rabbi Oshia Rabba (a late Tana) or by Rabba bar Nachmani (a third generation Amora); in any case, circa 3rd century CE[75].

We have already in earlier chapters analyzed in considerable detail the four cases of a-fortiori spotted in the *Chumash* by this Midrash, namely: Gen. 44:8, Exod. 6:12, Num. 12:14, and Deut. 31:27. The other six cases mentioned by it are: 1-Sam. 23:3, Jer. 12:5 (2 cases), Ezek. 15:5, Prov. 11:31, and Esth. 9:12. Presumably, this is intended to be a *full* enumeration; i.e. it is not just a list of ten cases among others, but an exhaustive list.

At first, I took this authoritative tradition that there are just these 10 *qal vachomer* arguments in the Bible for granted. But I must admit that over time, to my surprise (not to say, consternation, for I do not want to excite the ire of my religion's orthodoxy), I have been forced to revise that article of faith considerably. Closer scrutiny of the evidence makes indubitably clear that there are more likely **at least about *30 (thirty)* cases in the Bible**, and furthermore that one of the cases listed by the Midrash is open to doubt as a genuine case.

My first inkling that something was amiss was the quite fortuitous discovery of an a-fortiori argument in Job 4:17-19, while leafing through Maimonides' *Guide*[76]. I naturally assumed that the list given in the *Encyclopaedia Judaica*[77], which was my initial source, was erroneous by accident (this is not as far-fetched as it may sound: I once spotted a confusion between 2nd and 3rd figure hypothetical syllogism in the 1967 *Encyclopedia of Philosophy*[78]); and that the two cases counted under Jeremiah were really one, while the said argument in Job was perhaps merely omitted by the printers. I resolved to look into the original source, and confirm this assumption (I of course did look into *G.R.* eventually, but found the *E.J.* list correct).

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75 If it matters, the second tradition is upheld in the *Sefer Hadorot*, the first in the more recent *Tsemach David*.

76 P. 301.

77 Vol. 8, p. 367.

78 Vol. 4, p. 518.

Meanwhile, having had my consciousness of the issue of logical arguments in the Bible raised by my preceding research, I happened on a Shabbat, while studying the "*haftarah* of the week" *(Tazriaa)*, to notice yet another unmentioned case, namely 2-Kings 5:13. Again, my immediate reaction was defensive, conservative; I did not want to belie the tradition. I had early on in my formal researches looked with askance on the argument in Esther (we will return to this detail further on); so I thought, well, if we ignore this doubtful case, we still have a total of only ten a-fortiori arguments.

At about that time, as I described to people some of the difficulties I was coming across in my Biblical research, someone mentioned that there may be a case of *qal vachomer* in Daniel; but I could not find it offhand (as we shall see, I did find a probable case eventually).

Also, leafing through an *ArtScrolls* commentary on Genesis, I noted to my relief their comment that 'some editions' of the Midrash include Gen. 4:24 instead of Ezek. 15:5 in the list of ten. The Rashi commentary on this alternative sample, I then found (see Soncino *Chumash*[79]), is clearly formulated as a *qal vachomer*. (Assumably, then, Rashi favoured the special editions of the Midrash, since in his commentary to Gen. 44:8 he does not dispute the claim that there are only ten *qal vachomer* cases 'in the Torah' [in the larger sense of the term, meaning Tanakh] - this is said in passing).

Thus, in fact, in practice, at least eleven sentences in the Bible are recognized as a-fortiori by Rabbinical authorities taken collectively, and not just ten (though some say these ten and some say those ten, and they all agree on nine cases). How they reconcile this with the Midrash claim, which they apparently all continue to uphold undaunted, is beyond me: a contradiction is a contradiction. I do not know whether any among them have noted and acknowledged yet other cases of a-fortiori in the Tanakh, and if so how they dealt with the issues implied; but the issues are implied even with a joint list of just eleven cases. The simplest solution, it seems to me, would be to regard the Midrash claim as not intended as exhaustive; then there is no problem of doubting the Midrash's infallibility.

2. The Solution Found.

I tell this story in detail to demonstrate my goodwill, my reluctance to contradict authorities (but also my determination to find the factual truth). By now, it had become obvious that the common tradition on this topic was surely factually inaccurate, and that a systematic reevaluation was called for. But, how, other than by rereading the whole Tanakh carefully with this issue in mind? It was at this point that I had a very felicitous insight...

> *The a-fortiori arguments in the Tanakh are noticeably* ***not*** *signaled by expressions like "kol sheken" or "qal vachomer"!*

These expressions are utilized in Talmudic (Mishnah and Gemara) and post-Talmudic (Rabbinic) arguments and exposés, but not so far as I know in the Bible itself. If we actually

[79] P. 24.

look at the 10 cases mentioned by the (usual) Midrash, we find exclusively the following language:

Genesis:	*Hen* (behold)... *ve ekh* (how then)...
Exodus:	*Hen* (behold)... *ve ekh* (how then)...
Numbers:	... *halo* (is it not then that)...
Deuteronomy:	*Hen* (behold)... *ve af ki* (then also when)...
Samuel:	*Hine* (behold)... *ve af ki* (then also if)...
Jeremiah:	*Ki* (if)... *ve ekh* (how then)...; *u* (and if)... *ve ekh* (how then)...
Ezekiel:	*Hine* (behold)... *af ki* (then when)...
Proverbs:	*Hen* (behold)... *af ki* (also thus)...
Esther:	... *meh* (what)...

I saw almost at once that these various phraseologies might be viewed as signals of an intention to formulate an a-fortiori argument. After a while, I realized that these sentences have, indeed were bound to have, conditional form, with an antecedent clause (a minor premise), signaled by an "if" operator (one of the particles *hen/hine, ki, ve/u*), and a consequent clause (a conclusion), signaled by a "then" operator (one of the expressions *ve ekh, ve af ki, af ki, halo*, and eventually *meh*). These key words or phrases were limited in number, some half a dozen, and so could with relative ease be used in a search for other cases, if any, in a *Concordance of the Bible* (which is effectively a word index). Of course, there might be other significant expressions, besides those, but I left the question open; at least, this was a starting-point.

The following stage was painstaking research: each reference to a keyword in the Concordance was looked up in the Bible, to see whether or not it signaled an a-fortiori argument. In truth, I did not research all the keywords: I looked up all occurrences of ***ekh, ve-ekh, af, af-ki, ve-af, ve-af-ki, hen, ve-hen, halo, va-halo****;* but I did not have the patience to also research the words ***hine, ki***. It was quickly evident that not all occurrences of the keywords signaled a *qal vachomer* (only about 6 percent did so); on the other hand, I found by this method many new cases of the argument, i.e. cases not mentioned in the Midrash (about twenty). In all, I looked up some 500 references in the Bible; by that time my point was proven, since I had about three times the number of a-fortiori arguments I started with, and it did not seem important to pursue the matter further and attempt to be exhaustive.

As already said, I was not immediately conscious of the logical role played by the key words/phrases. At first, my approach was pragmatically philological; but once I grasped that what I had to look for were if/then operators, it became obvious that a more detailed linguistic analysis was called for: this laborious research is presented in the next chapter. In this context, I gradually understood the following (which *ex post facto* perhaps seems obvious, but was not immediately evident). Whereas in modern Hebrew, *im/az* are the closest and most commonly used equivalents of if/then, in Biblical Hebrew the language is more varied:

a. There are various alternative expressions for "if", such as *hen/hine, reu, ki, ve/u, im, be*; all these announce an antecedent: behold, see, if, when, because, in, etc. The

prefix *vav* (and) fulfills this function, like the other words, by presenting a context, in which certain later mentioned events occur.

b. There are various alternative expressions for "then", such as *af, ve, ki, im*; all these announce a consequent: all the more/less, therefore, then, so, etc. The word *af*, often translated as 'all the more/less' (its distinctively a-fortiori reading), more broadly means 'also, similarly'. The word *ki*, which in modern Hebrew usually has the limited meaning of 'because', has evidently in Biblical Hebrew a broader range of meaning, including even 'then'. The use of *vav* (and) in the sense of 'then' is also found in English (e.g. "Press the button and the motor starts"), and therefore needs no explanation.

c. Antecedents and consequents need not in Biblical Hebrew, anymore than in the modern idiom or in English or French, be signaled by any "if" or "then" operators; they may be tacitly understood by the context, or be left out to avoid repetitions. (Nowadays, we often use a comma to signal a tacit "then" in written texts.) Grammatically, logical operators are merely 'conjunctions', they serve to bring sentences together in various ways.

d. Although initially expressions like *hen, af-ki, ve-af-ki, ve-ekh, halo* made it possible for me to discover a-fortiori arguments, I eventually realized that they were not or not-wholly in fact logically essential factors in these arguments. *Ekh* (how) and *halo* (is it not that) are never then-operator of arguments, but always an integral part of the consequent/conclusion in which they appear, serving as rhetorical devices: how will you do this? meaning, you cannot do it; is it not that so and so? meaning, it is so and so. As for *af-ki, ve-af-ki,* although the *af* particle serves as then-operator of arguments, the *ve* and *ki* may have a role either as if-operator of the argument, or as if or then operator of its premise and/or conclusion.

In this context, I would like to refer the reader to Esra Shereshevsky's very interesting analysis of Rashi's interpretative techniques, where some of the fine nuances in the meaning of words like *ve* and *ki* are discussed[80].

Apart from that, please note that my use of the operators *if/then* is here very loose, generic (and not exclusively logical); I do not here push the analysis on down to deeper levels, to distinguish between the different modal types of conditioning: the logical (*if*), the natural/temporal (*when, at such times as*), and the extensional (*in such instances as*). The if/then operators of any logical argument are of course of logical modality, but the conditional premises and conclusions (if any) they enclose may be of other modal types.

3. The Data and their Analysis.

The table below lists the results of these researches, my own proposed list of Biblical a-fortiori arguments. I repeat, it is not necessarily exhaustive; and it should be added, some of the arguments are strong, unassailable, some are comparatively weak, open to rebuttal, but I think they are all reasonably clear samples of the form. Opposite each Biblical reference I indicate the apparent if/then logical operators (if any), and parenthetically any of the typical a-

80 Pp. 73-99.

fortiori expressions *hen, hine, lahen, af-ki, ve-af-ki, ve-ekh, halo,* which helped me personally find the case in addition to the operators themselves.

Table 5.1 Proposed list of Biblical A-Fortiori.

No.	REFERENCE	OPERATORS	INITIAL CLUES
	Torah Books		
1	Gen. 4:24	**ki/ve**	(tradition)
2	Gen. 44:8	**hen/ve**	hen, ve-ekh
3	Exod. 6:12	**hen/ve**	hen, ve-ekh
4	Num. 12:14	**-/-**	halo
5	Deut. 31:27	**hen/af**	hen, ve-af-ki
	Historic Books		
6	1-Sam. 14:29-30	**reu/af**	af-ki
7	1-Sam. 21:6	**ki/af**	ve-af-ki
8	1-Sam. 23:3	**hine/af**	hine, ve-af-ki
9	2-Sam. 4:10-11	**ki/af**	af-ki, halo
10	2-Sam. 12:18	**hine/ve**	hine, ve-ekh
11	2-Sam. 16:11	**hine/af**	hine, ve-af-ki
12	1-Kings 8:27	**hine/af**	hine, af-ki
13	2-Chron. 6:18	**hine/af**	hine, af-ki
14	2-Kings 5:13	**ki/af**	ve-af-ki
15	2-Kings 10:4	**hine/ve**	hine, ve-ekh

	Other Books		
16	Job 4:17-19	**hen/af**	hen, af
17	Job 15:15-16	**hen/af**	hen, af-ki
18	Job 25:5-6	**hen/af**	hen, af-ki
19	Ps. 78:20	**hen/gam,im**	hen
20	Ps. 94:9	**-/-**	halo
21	Ps. 94:9	**im/-**	halo
22	Ps. 94:10	**-/-**	halo
23	Prov. 11:31	**hen/af**	hen, af-ki
24	Prov. 15:11	**ki/af**	af-ki
25	Prov. 19:7	**ki/af**	af-ki
26	Prov. 19:10	**ki/af**	af-ki
27	Prov. 21:27	**ki/af**	af-ki
28	Jer. 12:5	**ki/ve**	ve-ekh
29	Jer. 12:5	**u/ve**	ve-ekh
30	Ezek. 15:5	**hine/af**	hine, af-ki
31	Dan. 2:9	**lahen/ve**	lahen

We see that there are at least 31 cases of a-fortiori in the Tanakh, 5 of them in four books of the Torah proper, and 26 more in eleven other books (counting Samuel and Kings as two each). Some of these arguments are repetitive, and perhaps should not be counted as distinct. For instance, 1-Kings 8:27 and 2-Chron. 6:18 are definitely one and the same argument, reported in two different books. The three arguments in Job might be counted as one and the same thought, in spite of small verbal variations; and similarly the two in Jeremiah. The two arguments in Ps. 94:9 have the same major premise, and might be viewed as a compound. On the other hand, Ps. 78:20 might be viewed as two arguments with the same premises but separate conclusions, instead of a single argument with a compound conclusion. Thus, the total number may be as small as 26, or as large as 32, depending on how we count. In any event, the above table may be summarized as follows:

Table 5.2 Frequencies of A-Fortiori Operators.

OPERATORS	(HEBREW)	FREQ.	LOCATIONS
ki/af	כי/אף	7	1S, 2S, 2K, Pr.
hen/af	וא/הן	5	Dt, Jb, Pr.
hine/af	וא/הנה	5	1S, 2S, 2K, 2C, Ez.
reu/af	וראו/א	1	1S.
ki/ve	ו/כי	2	G, Jr.
u/ve	ו/ו	1	Jr.
hen/ve	הן/ו	2	G, Ex.
hine/ve	ו/הנה	2	2S, 2K.
lahen/ve	ו/להן	1	Dn.
hen/gam,im	אם,גם/הן	1	Ps.
im/-	.../אם	1	Ps.
-/-	.../...	3	N, Ps.

We note that, broadly speaking, the individual key words/phrases, and more significantly their combinations, seem to be fairly evenly distributed throughout the Bible: the language is on the whole pretty uniform. Some books, such as Leviticus, Joshua, Judges, and others, have no a-fortiori arguments to my knowledge; but I see no reason why they should, nor what might be inferred from the fact (perhaps somebody else might eventually). If we pay attention to the traditional dating of the reported speakers in each of the above arguments, we find the following results:

Table 5.3 A-Fortiori Arguments: By Whom, How Often, When.

SPEAKER	FREQUENCY	TRADITIONAL DATING
Lemech	1	Pre-Deluge
Joseph's Brothers	1	Patriarchal
Moses	5	Sinaitic
God (thru Moses)	1	Sinaitic
Eliphaz	2	Sinaitic
Bildad	1	Sinaitic
Jonathan	1	United Kingdom
David	3	United Kingdom
David's men	2	United Kingdom
Asaph	1	United Kingdom
Solomon	7	United Kingdom
Naaman's servants	1	Northern Kingdom
Jezreel rulers	1	Northern Kingdom
God (thru Jeremiah)	2	End of First Temple
God (thru Ezekiel)	1	End of First Temple
Nebuchadnezzar	1	First Exile.

We see in the above table that apart from 4 of the arguments attributed to God, 21 (68%) of them are spoken by Jews and 6 (19%) by non-Jews. Thus, judging from Biblical sources alone, this form of reasoning seems to be rather predominantly Jewish, though not unknown to non-Jews. I do not intend this remark as racist, but merely wish to arouse interest in historical studies of logic. It would be interesting to know whether a-fortiori arguments appear, say, in Sumerian, Babylonian, Egyptian, Canaanite, Assyrian, or Greek epigraphs or documents; and if so, as of when and how often.

Furthermore, out of 31 cases, only 2 are pre-Sinaitic; 9 (29%) are from Mose's time, meaning about 13th century BCE; 14 (45%) are from the monarchies of Saul, David and Solomon, roughly mid-9th/mid-8th century BCE; and the remaining 6 (19%) are from the period from the splitting of the kingdom to the Babylonian Exile, roughly mid-8th/mid-4th century BCE.

In the course of this research, it occurred to me that the language used in the Bible for a-fortiori arguments (and eventually for other types of reasoning) might serve as a dating tool, to resolve issues between Traditionalists and "Higher-Critics" with regard to the ages and authorship of the various books of the Bible. However, looking at the above results, I

personally see no firm conclusions possible in this respect (even if the dating proposed by the Critical school is considered in lieu of the traditional).

The only overall conclusion I can suggest is that a-fortiori argument was a rather common form of reasoning since early on in the Biblical narrative, and on up to its end, with the greatest frequency occurring in the 9th-8th centuries BCE. Perhaps, after all, the valuable conclusion to draw is that the hypothesis of some of the critics that most of the earlier books of the Bible were composed, or at least compiled, much later than tradition claims, i.e. at about the same time as most of the later books, is if not eliminated at least *not justified* by this data, since if it were true one might expect more, or as, frequent use of the a-fortiori argument in the later books compared to the earlier books. But even this is barely probabilistic and open to debate, of course.

4. Synthesis of Results.

Now, let us return to the discussion regarding the number of a-fortiori arguments in the Bible. First, let me mention in passing that I doubt seriously that Esth. 9:12 qualifies as a genuine *qal vachomer* argument; I demonstrate this at length in the next chapter already mentioned. I may add here that although *Genesis Rabbah* purports to embody the undebatable tradition and final truth on the matter, its apparent error in enumerating only 10 *qal vachomer* arguments in the Bible, when there are evidently at least some three times that number, allows us to evaluate its statements much more critically, and doubt that this 10th statement really qualifies as a *qal vachomer*.

I say 'apparent' error, because one might always put forward the defense that the ten statements chosen by the Midrash were in fact in some hidden way *special*, having something the others lack. Indeed, a Rabbi of my acquaintance, R. Alexander Safran of Geneva, upon being told by me of the discovery of *qal vachomer* arguments other than the Midrashic ten, offered precisely this defense.

Now, it must be stressed that there is evidently *no formal or linguistic distinction possible*: that is evident from all our discoveries and insights and cannot be contested. Therefore, as always in such situations, the defenders of the faith must fall back onto homiletic or mystical interpretations, and claim these ten statements as having some special ethical, historical, or qabalistic import that the others lack. I leave that job to whoever.

A more intriguing defense was suggested to me by a friend, Sammy Soussan, who studies in a *kollel* (Talmudic study group) in Aix-les-Bains. He asked me to verify whether the Midrash's ten *qal vachomer* arguments might not simply be *samples* of ten distinct *formal types*, whose typology and no other would be merely repeated in the other twenty or so cases I found. My immediate response was that such a view was unlikely to be true, because my formal studies have revealed that the number of distinct forms is (according to how counted) two, four, or eight, but not ten (nor five).

As we saw earlier, an a-fortiori may be positive or negative, subjectal or predicatal (if categorical) or antecedental or consequental (if conditional). With regard to the ten (or eleven) Midrashic a-fortiori, they have the following logical forms (most naturally, though they can be

recast into other forms): 2 are positive subjectal, 3 are negative subjectal, 2 are positive predicatal, and 2, 3, or 4 are positive antecedental; more specifically:

Gen. 4:24 is negative subjectal;
Gen. 44:8 is positive predicatal;
Exod. 6:12 is negative subjectal;
Num. 12:14 is positive subjectal;
Deut. 31:27 is positive predicatal;
1-Sam. 23:3 is positive antecedental;
Jer. 12:5 has two positive antecedentals;
Ezek. 15:5 is negative subjectal;
Prov. 11:31 is positive subjectal;
Esth. 9:12 is positive antecedental (if at all a-fortiori).

It is interesting to note anyway that Gen. 4:24 and Ezek. 15:5 are both negative subjectal in form, because if (a) only one or the other Midrashic list of *qal vachomer* arguments is to be adopted, but not a fusion of both, though both must be accepted as equally valid, and (b) the Soussan hypothesis turned out to be correct, then these two a-fortiori arguments would have to be of the same form, which they are. Nevertheless, the hypothesis is incorrect, because its main prediction, namely that the Midrashic list of ten includes ten (or five) distinct forms, cannot be upheld.

None of these cases, read simply, are negative predicatal, negative antecedental, or either way consequental, in form; therefore, if at best the Midrash may be said to hint at the formalities of a-fortiori, it does not represent them all. Furthermore, it can be shown on a case-by-case basis that all the Biblical a-fortiori, recognized as such in the present study, fall neatly into our classification; i.e. that as far as the data at hand is concerned, this classification is exhaustive. This reasoning would seem to preclude the proposed defense: we can predict with confidence that the Midrash is not a taxonomy.

Alternatively, we might consider the possibility that the Midrash list of ten *qal vachomer* arguments reveals ten types of *phraseology*. There are various aspects to this linguistic question: we may focus on individual operators or on their combinations or on key words/phrases or on their combinations in turn. Also, we may ask whether the Midrashic list amounts to precisely ten such expressions, and we may ask whether that number is (in view of new discoveries) exhaustive.

Firstly, we must admit that the Midrashic list does not cover *all* the individual operators or combinations thereof found in Biblical a-fortiori. With regard to if-operators, it includes *hen, hine, ki, u,* but ignores *reu, im, lahen*; with regard to then-operators, it includes *ve, af, meh,* and ignores *gam, im*. These oversights are somewhat open to debate: the sentences concerned could be constructed or understood without interpreting these words as operators; but in any case the total number is not ten (it is 7 in the Midrash list, and 11 in mine).

With regard to combinations of operators, while the list spots *ki/ve, u/ve, hen/ve, hen/af, hine/af, -/meh, -/-*, it misses the most frequent combination *ki/af*, as well as *hine/ve,*

lahen/ve, reu/af, hen/gam,im, im/-; and in any case, again, the total number is not ten (but 6-7 in the Midrash, and 12-13 in my view).

As for the number of individual key words/phrases presented by the Midrash, it is also nine; *hen, hine, ki, u/ve, ve-ekh, halo, ve-af-ki, af-ki,* and *meh*, however we organize our list. Unless, that is, we regard the *u* signaling the antecedent of the second part of Jer. 12:5, and the *ve* which flags the consequent of Gen. 4:24, as two distinct terms, which they are in meaning (*u*=if, *ve*=then) though not in spelling (vav). In that case, and retaining Esth. 9:12, we obtain the desired number of ten distinct key words/phrases in the Midrash. However, the Midrash is not exhaustive in this respect; since, in a larger perspective, 4-5 expressions are missing here, namely: *reu, im* (as "if" or as "then"), *gam, lahen*.

With regard to key words/phrases in combination, since two of the cases the Midrash lists use the same language (*hen/ve-ekh* in Gen. 44:8 and Exod. 6:12), there are only nine combinations, even if we like Rashi include Gen. 4:24 (*ki/ve*) in the list instead of Ezek. 15:5 (since its *hine/af-ki* is then excluded). However, if we both count Jer. 12:5 as one *qal vachomer* instead of two, but one which reveals two phraseologies, and include Gen. 4:24 in the list without excluding Ezek 15:5, and of course (contrary to my recommendation) do not leave out Esth. 9:12, we obtain the desired number of ten distinct combinations of key expressions. But here again, this number is not exhaustive, ignoring as it does combinations like *reu/af-ki, ki/ve-af-ki,* and so on.

To sum up: to its credit, the Midrash list reveals crucial expressions like *ve-ekh, halo, ve-af-ki,* etc., which signal *qal vachomer* arguments (though not invariably). It includes ten (or eleven) Biblical samples (I say 9-10) of *qal vachomer*; and these samples can be acknowledged to display ten key expressions and ten combinations thereof. *However,* the Midrash listing of 10 cases is certainly *incomplete*, whether regarded statistically, logically or linguistically.

Thus, we have found no scientific justification of the Midrashic listing of *only ten qal vachomer* arguments. It must be viewed as intended, in the said respects, to be at best a partial and random set of examples. If the author of the list intended it to be complete or systematic with reference to the number of samples or to logical formalities or to language forms, he failed: his research was sloppy. The only possible way out of these conclusions is, following the Safran hypothesis, to presume that the author had homiletic or mystical motives for his selection.

5. Talmudic/Rabbinic A-Fortiori.

A final word, concerning a-fortiori argument in Talmudic and post-Talmudic Rabbinic literature. The *language* actually used in such literature for a-fortiori reasoning is various, and according to *The Practical Talmud Dictionary* of four main types (as listed below). See also *Talmudic Terminology*[81], and other similar books on the subject.

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81 Pp. 69-70.

a. Various phrases with the word *din* (meaning logical judgment, usually a-fortiori), namely: ***eino din she, din, dina*** (Aram.)***, bedin, vedin hu, vehadin notein, vehalo din hu***.

b. Variants of *kol sheken* (meaning 'all the more so'), namely: ***kol sheken, kol deken*** (Aram.)***, lo kol sheken.***

c. The expression ***al achat kamah vekamah*** (meaning 'if in this case... how much more so in that other case'). This expression is reportedly used more in Hagadic than Halakhic contexts.

d. And the defining expression ***qal vachomer*** (meaning 'leniency and strictness'; note that *qal* should more precisely have been *qol*, being a noun like *chomer*).

With regard to the *frequency of use* of this terminology, not having a concordance of post-Biblical literature, I cannot say with precision what it is in fact. If we refer to the Index Volume of the Soncino edition (1952) of the Babylonian Talmud, we find the entries enumerated below, which suggest a minimum of 137 arguments of the type concerning us. I say 'suggest', because the references are to page numbers, which may contain more than one argument of the same type; also, not having looked at them, I cannot guarantee that they are all legitimate cases. I would suspect offhand, on the basis of my minimal experience of Talmud study, that this list is incomplete (all the more so if we include the Commentaries).

A fortiori	52
A minori ad majus	31
Deduction, proofs by	2
Inference from minor to major	8
Kal wa-homer	34
Major, inference from minor to	8
Minor, inference from major to	2

In comparing Biblical and Talmudic/Rabbinic literature, certain trends are observable, with regard to the a-fortiori argument. First, with respect to *quantity*: the Tanakh records at least some thirty cases (which does not of course mean that there were not much more unrecorded cases); in the Talmud I would venture to guess offhand the number of cases to be in the hundreds, and if we look at later literature (for example, Rashi, who seems to have a predilection for the form), it appears very common there too.

Second, with respect to *quality*: the complexity and confidence of a-fortiori use is progressively greater; more complicated conditional arguments are used, more elements of the argument are left tacit. This has to do with the *level of theoretical support and linguistic sophistication*: the a-fortiori language of Biblical times is colloquial and general (undifferentiated if/then terminology is used, typical expressions like *ve-af-ki* occur in contexts other than a-fortiori); in Talmudic times, and thereafter, we find common use of expressions

like *qal vachomer* or *kol sheken* which indicate a theoretical reflection (like the work of Hillel, Shammai, R. Akiba, or R. Ishmael), and constitute a much more specialized lexicon.

I would like to point out that the *absence* in the whole Bible of such technical expressions would tend to belie the anachronistic thesis that Talmudic-style *pilpul* (more or less logical argumentation for interpretative purposes) existed in an already highly developed form in Biblical times. Had, say, king David already had a similar intellectual context, and studied daily in a similar manner (as some commentators later claimed), would he not have tended to use an equally explicit vocabulary, even in his everyday discourse (as is the case with Rabbis, scholars and students even today)?

That is, the claim that the gift of the Torah at Sinai included a ready-made oral equivalent of the Talmud and later writings, with all the accessory hermeneutic principles more or less clearly implied, does not seem confirmed by the foregoing observations. *Absence of evidence is of course not proof to the contrary, but it weakens a thesis somewhat.* The alternative theory, that consciousness or at least verbalizing of logic underwent a historical *development* after Sinai seems, in the light of the above, more credible.

On the other hand, the above observations tend to confirm the tradition that all the books in the Biblical Canon are rather ancient. The claim by some critics that, for instance, the book of Daniel is a literary product of much later times, seems belied by its logical language (*lahen/ve*), which is rather typically Biblical. Of course, even that can be faked; but to do so would imply a certain awareness of the logical idiom of the Bible, which as we have seen even the author of the *Genesis Rabbah* some centuries later had apparently not fully mastered.

In the last analysis, however, it is hard to say precisely when, between Biblical and Mishnaic times, the change in logical language occurred. The most likely hypothesis is that it occurred just where the extant written record places it: namely, more or less abruptly, in the way of a cultural revolution, during the formative century or two of the Mishnah (roughly, 1st century BCE to 1st century CE), continuing on through the centuries during which the Gemara was developed.

For, as is evident from its form and content, the intellectual reflection on logic, which gave rise to this language change and is manifest in it, did not occur in a vacuum, as pure philosophical theory, but as *ad hoc* response to the specific issues the Talmudic Rabbis encountered in formulating their legal thoughts and debates. This verbal reflection on logic, like its legal context, must have been written down to some extent at about the same time as it was developed, for the simple reason that the human mind, even at its best, can only handle so much data by itself; after which it needs material supports.

Just as arithmetic calculation cannot develop far without pencil and paper, and eventually algebraic tools (and still further on, computers); and likewise endeavors like architecture are limited without geometrical drawing, and eventually theoretical equipment (and later still, more sophisticated technologies); so without the use of *written* words to solidify past stages of thought and debate, and eventually abstract reflection on the logical methodology underlying it, cogitation cannot credibly develop beyond a certain intellectual level.

6. THE LANGUAGE OF BIBLICAL *A-FORTIORI*.

In this essay, my purpose is to analyze the language actually used in Biblical a-fortiori statements. An empirical study, without preconceptions.

A Biblical a-fortiori argument, as we saw, usually consists of two more or less explicit sentences, one of which is the minor premise and the other the conclusion; the major premise is always more or less tacit. The said premise and the conclusion may be, one or both of them, categorical or conditional in form, and may be expressed in full or be in part merely implied.

The premise and conclusion are usually, though not always, signaled by words which serve as "if" and "then" operators, respectively. However, such keywords sometimes concern, not the argument as such, *as a whole*, but instead belong *within* clauses subsidiary to the argument. Our job here, therefore, is to distinguish and avoid confusion between the if/then operators (if any) which frame the argument's antecedent (premise) and consequent (conclusion), from the operators (if any) which play a role as part of these sentences.[82]

1. Torah Books.

Genesis 4:24. Lemekh ben Methushael:

> "If (***ki***): Cain shall be avenged sevenfold,
> then (***ve***): Lemekh [shall be avenged] seventy and seven-fold."
>
> > Rashi's reading: If the punishment on Cain, who willfully murdered, was delayed seven generations, surely my [Lemekh's] punishment will be deferred for many times seven, seeing that I slew unintentionally.

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[82] I have referred to various standard translations: for the Pentateuch, Samuel and Kings, mainly to the more classical *Soncino Books of the Bible*; for the Psalms, to *The Metsudah Tehillim*, and for the rest to *The Jerusalem Bible*. In some cases I have had to make small modifications in the choice or order of words, called for by the needs of our analysis. I make an effort to explain the positions I have taken; though if situations are similar, I try to avoid repeating myself. (The mystically inclined may find it interesting to notice, in passing, the content of the Biblical passages this research happens to have brought together; their collective message, as it were.)

The if/then operators of this argument are ***ki/ve***. I must say that without Rashi's commentary, this verse would seem pretty obscure, to me at least. This perhaps attests to its true antiquity. In any case, we may accept Rashi's interpretation of the sentence as an a-fortiori argument. The story-context he adduces from tradition is that Lemekh slew Cain accidentally while hunting for deer.

Note that this a-fortiori argument is not perfectly constructed; although the movement from willful to unintentional (the tacit major premise) is indeed a-fortiori, the transition from seven (in the minor premise) to seventy-seven (in the conclusion) does not obey the "*dayo*" rule: there is an extrapolation involved, which may have an inductive justification, but which is weak from the deductive point of view. However, although this is a Biblical passage, it has no Halakhic authority which might support non-*dayo* reasoning, being the private pronouncement of Lemekh, and not a statement of Divine or prophetic origin.

Genesis 44:8. Joseph's Brothers:

> "Behold (***hen***): the money, which we found in our sacks' mouths, we brought back unto thee out of the land of Canaan;
>
> then (***ve***): how (*ekh*) should we steal out of thy lord's house silver or gold?"

Here, the if/then operators are ***hen/ve***. *Hen* (behold) signals a presentation of evidence; while *ve* (and) presents the inference to be drawn from it. The expression *ekh* (how) is part of the conclusion, serving rhetorically to deny the brothers' ability to steal; it literally means: given the evidence, 'how could anyone logically uphold' such a claim (that the brothers would steal). Thus, *ekh* signifies *necessity* of the denial of a claim: it has *a modal function*; and so we could regard it as qualifying the overall relation between premise(s) and conclusion, instead of as merely an internal qualifier of the conclusion.

Exodus 6:12. Moses:

> "Behold (***hen***): the Children of Israel have not hearkened unto me;
>
> then (***ve***): how (*ekh*) shall Pharaoh hear me?"

Same language as in the previous case.

Numbers 12:14. God:

> "[Granting that:] if (*ve*) her father had but spit in her face, should she not (*halo*) hide in shame seven days?
>
> [Similarly, since God is angry with her,] let her be shut up without the camp seven days."

In this case, the argument as a whole, although clearly a-fortiori in intent, is expressed *without explicit if/then operators* (this is not disturbing, but a common manner of speaking in all languages). The stated premise is a conditional proposition, with *ve* as its if-operator but without explicit then-operator; the expression *halo* serves a rhetorical purpose within the consequent. The conclusion (as seen in our earlier technical analysis), though stated as a categorical proposition, should be read as a conditional one devoid of explicit operators; its tacit antecedent clause being the fact of Divine disapproval, while its consequent is similar to the premise's.

With regard to *halo* (is it not that): it expresses in the speaker and causes in the hearer a certain turn of mind, which is not peculiarly Hebrew or oriental, but is equally to be found in western formal logic. Its role is to remind us of the following formality: 'if X, then Y' means that X *cannot but* exist with Y, and not merely that X and Y happen to have occurred together. Thus, *halo*, like *ekh*, is a modality, though of opposite polarity; while *ekh* means 'must deny' (=cannot affirm), *halo* means 'cannot but affirm' (=must affirm); and, in the last analysis, such modality may just as well be viewed as concerning the whole antecedent-consequent relation concerned, rather than merely the consequent part of it.

Deuteronomy 31:27. Moses:

> "Behold (***hen***): while (*be*) I am yet alive with you this day, ye have been rebellious against the Lord;
>
> how much more (***af***): in the time (*ki*) after my death, so (*ve*) [i.e. will ye be rebellious]?"

Here, I suggest, the if/then of the a-fortiori argument as such are ***hen/af***. The premise is a conditional proposition with *be* as its if-operator, and no explicit then-operator. The conclusion is similarly a conditional proposition, with *ki* as its if-operator, and *ve* (meaning, so or the-same) as its then-operator tacitly implying 'ye will be rebellious'. The expression actually used in the text is *ve af ki*, but the elements of this expression play distinct roles in the statement, which is why I have slightly reshuffled them.

2. Historical Books.

1 Samuel 14:29-30. Jonathan:

> "See (***reu***): because (*ki*) I tasted a little of this honey, how (*ki*) mine eyes are brightened.
>
> How much more (***af***): if (*ki*) haply the people had eaten freely today of the spoil of their enemies which they found, then (*ki*) would there not have been a much greater slaughter among the Philistines?"

Here, the *qal vachomer* is a larger if/then statement, signaled by ***reu/af***, within which are contained two smaller if/then statements, signaled by *ki/ki*, which are respectively the minor premise and the conclusion of the argument. (Note the reshuffle of antecedent and consequent in the premise for the sake of logical clarity. The original, opposite, order serves merely a rhetorical purpose: from phenomenon to its explanation, from effect to cause - it is a didactic presentation.) Dayo principle ignored.

1 Samuel 21:6. David:

> "Of a truth (***ki***): when (*be*) I came out, though (*ve*) it was but a common journey, yet (*im*) women have been kept from us about these three days, and (*ve*) the vessels of the young men were holy;
>
> how much more (***af***): when (*ki*) today there shall be holy bread in the vessels, so (*ve*) [i.e. have we avoided women and kept the young men's vessels holy]."

In this case, the *qal vachomer* proper is formed with the operators ***ki/af***. It has a conditional proposition, with a compound antecedent and a compound consequent, as premise (here re-ordered for clarity); and another, with a simple antecedent and a tacit but obvious enough compound consequent, as conclusion. The operators (*be/im*) and conjunctives (*ve*) within the premise, and those within the conclusion (*ki/ve*), are not to be counted among the operators of the argument as such.

1 Samuel 23:3. David's men:

> "Behold (***hine***): here in (*be*) Judah [=our own territory], we are afraid;
>
> how much more (***af***): if (*ki*) we go to Keilah [=enemy territory], so (*ve*) [i.e. will we be afraid]?"

Here, the operators of the a-fortiori as such are ***hine/af***. The premise is in conditional form, its antecedent being signaled by *be*, but its consequent having no signal (as is common in all languages). The conclusion is announced by the phrase *ve af ki*: the *af* of this phrase belongs, as we said, to the *qal vachomer* construction, while the *ve* of *ve af ki* serves to imply the consequent of the conclusion, equating it to the consequent of the premise (and it is for this reason left tacit in the text, to avoid repetition), and the *ki* of *ve af ki* refers to the antecedent of the conclusion.

2 Samuel 4:10-11. David:

> "If (***ki***): [when] one told me saying, 'behold, Saul is dead' and (*ve*) he was in his own eyes as though he had brought good tidings, then (*ve*) I took hold of him and (*ve*) slew him in Ziklag in the way of reward.

> How much more (***af***): when (*ki*) wicked men have slain a righteous man in his own house upon his bed, then (*ve*) now shall I not (*halo*) require his blood of your hand and (*ve*) take you away from the earth?"

In this case, the argument's if/then operators are ***ki/af***. The minor premise consists of a conditional, with both theses compound, without explicit if-operator (unless the initial *ki* is intended to serve a dual purpose, to avoid saying ***ki*** *ki*) and with *ve* as then-operator. The conclusion is also a conditional proposition, with a compound consequent, with *ki/ve* as operators. The extra occurrences of *ve* serve to signal compound antecedences or consequences. Dayo principle obeyed.

2 Samuel 12:18. David's servants:

> "Behold (***hine***): while (*be*) the child was yet alive, [David's sorrow was so great that] we spoke unto him, and (*ve*) he hearkened not unto our voice;
>
> then (***ve***): how (*ekh*) shall we tell him that the child is dead, so that (*ve*) he do himself some harm?"

In this case, the operators of the *qal vachomer* as a whole are ***hine/ve***, and these frame two conditional propositions. One, the premise, has *be* as if-operator, but no visible then-operator (and indeed part of its compound consequent is also tacit); the other, the conclusion, has no visible if-operator, though it has *ve* as its then-operator (*ekh* serves an internal rhetorical purpose in the conclusion: without *ekh* the conclusion would be merely hypothetical 'if we tell him, he will harm himself', *ekh* signals a pursuit of the reasoning by apodosis 'we do not want him to harm himself, therefore we cannot tell him').

Note that the whole a-fortiori argument is itself enclosed in a wider antecedent/consequent (not shown above), expressed by *ki* (because they thought thus), *ve* (therefore they feared to tell him). All these sentences within sentences can lead to confusion; that is why it is important to analyze their logical hierarchy carefully, if we want to be clear as to the identity of a-fortiori argument *per se*. Dayo principle ignored.

2 Samuel 16:11. David:

> "Behold (***hine***): my son, who came forth from my body, seeketh my life [still, I do not react];
>
> how much more (***af***): in the case of (*ki*) this Benjamite now [who is less close], and curseth [me], then (*ve*) should I let him alone; for the Lord has bidden him."

Here, the argument is signaled by ***hine/af***. The premise is a conditional proposition without any explicit operator, and with a tacit consequent implied by the conclusion. The conclusion takes the *ki* of the expression *ve af ki* as if-operator and, we might say, its *ve* as then-operator. But more precisely, the conclusion, having an explicit consequent, can do without the *ve* conjunction, which rather serves to imply the tacit consequent of the premise.

As for the phrase 'for the Lord has bidden him,' its function is to strengthen the bonds between antecedent and consequent in the premise and the conclusion; for neither of these bonds is naturally automatic, but they proceed from a volitional choice by David. One might well object that the leeway a king's son may be granted is not applicable to a mere subject like Shimei (the Benjamite in question); in that case, David's argument seems weak: at worst concealing passivity or fatalism, at best mercifulness in time of trouble. For this reason, David has to explain himself, clarify his motivation, and point to his general attitude of acceptance of God's will. Once the if/then bonds are thus firmed, the *qal vachomer* as such can proceed more credibly.

1 Kings 8:27 and 2 Chronicles 6:18. Solomon:

> "Behold (***hine***), heaven and the heaven of heavens cannot contain thee;
>
> how much less (***af***): in the case of (*ki*) this house that I have builded, will (*ki*) God in very truth dwell on the earth [i.e. be contained in this house]?"

Here, the a-fortiori is expressed through ***hine/af***. The premise is categorical in form, needing no operators; and the conclusion uses the operator *ki* for both its antecedent and consequent, the former deriving from the expression *af ki*, and the latter being stated in the original text even before the premise, together with the consequent of the conclusion (which is here properly moved to last place).

2 Kings 5:13. Naaman's servants:

> "Granting (***ki***): had the prophet bid thee do some great thing, wouldest thou not (*halo*) have done it?
>
> how much rather (***af***): he [merely] saith to thee: wash and be clean? then (*ve*) [you should do it]"

In this argument, ***ki*** and ***af*** might be taken from the key phrase *ve af ki* as the if- and then- operators of the a-fortiori argument as a whole. The premise is a conditional proposition, bare of any explicit operators (though containing the rhetorical expression *halo*). The conclusion consists of an explicit antecedent with a tacit if-operator, and a tacit consequent implied by the explicit *ve* in the key phrase. (This interpretation is open to debate: one might equally have regarded the *ki* as if-operator of the conclusion, or of the premise; or it might be viewed as playing a triple role. See also Prov. 15:11 below.)

2 Kings 10:4. The rulers of Jezreel in Samaria:

> "Behold (***hine***): the two kings [Joram and Ahaziah, who were powerful men], stood not before him [Jehu];
>
> then (***ve***): [we, who are relatively weak,] how (*ekh*) shall we stand [before him]?"

In this case, the a-fortiori is signaled by ***hine/ve***. The premise and conclusion have no explicit operators, because, though explicitly categorical, they are implicitly of conditional form. Dayo principle obeyed.

3. Other Books.

Job 4:18-19. Eliphaz the Temanite:

> "Behold (***hen***): He puts no trust in His servants, and (*u*) His angels he charges with folly;
>
> how much more (***af***): those who dwell in houses of clay, whose foundation is in the dust [does He distrust and charge with folly]?"

Job 15:15-16. Eliphaz the Temanite:

> "Behold (***hen***): He puts no trust in His holy ones; and (*ve*) the heavens are not clean in His sight.
>
> How much less (***af***): one who (*ki*) is abominable and filthy, man, who drinks iniquity like water [does He trust or consider clean]!"

Job 25:5-6. Bildad the Shuhite:

> "Behold (***hen***): even the moon has no brightness, and (*ve*) the stars are not pure in His sight;
>
> how much less (***af***): man, that (*ki*) is a worm [is bright and pure in His sight]?"

In Job, we find three a-fortiori arguments with very similar wording and significance, namely that man cannot judge God, being infinitely morally inferior to Him. In each case, the operators of the argument are ***hen/af***. The latter two cases involve the expression *af ki*; whereas the first case has *af* without *ki*, which proves incidentally that the word *af* can be used independently of *ki*.

Psalms 78:20. Asaph:

> "Behold (***hen***): He struck a rock, then (*ve*) waters flowed and (*u*) streams burst forth.
>
> In that case (***gam***): bread He can give; is there any doubt that (***im***): He will prepare meat for His people?"

The if-operator of argument is ***hen***, and ***gam*** and ***im*** seem to be its then-operators. The premise is a conditional proposition, without if-operator, though with *ve* as then-operator to a compound consequent. The conclusion is double, a compound of categoricals. The implicit major premise has to be, for a-fortiori purposes, that it is just as hard (or harder) to get water from a rock as (or than) to provide bread and meat. Incidentally, 'Asaph' probably refers to the Levite serving in the Temple during David's reign, mentioned in 1 Chron. 16:7.

Psalms 94:9-10. Moshe:

> "He who implanted the ear, does He not (*halo*) hear?"
>
> "If (***im***) He formed the eye, does He not (*halo*) see?"
>
> "He who chastises nations, does He not (*halo*) reprove [the individual]?"

Here, we have three distinct *qal vachomer* arguments, with the same thrust (in each case, the conclusion is something easier to do than the premise[83]). One of them has ***im*** as if-operator, but two of them have no if-operator; and none of them has a then-operator, though all three use instead the rhetorical expression *halo*.

Proverbs 11:31. Solomon:

> "Behold (***hen***): the just man shall be recompensed on earth:
> how much more (***af***): the wicked and the sinner, so (*ki*) [i.e. shall be recompensed on earth]."

This statement is a-fortiori only if 'recompense' is interpreted negatively as in "if the just man (who has few sins) will be *punished* here on earth, all the more will the wicked and the sinner (who has many sins) be so *punished*" (this being 'minor to major' positive subjectal, valid). If 'recompense' were interpreted positively, the statement would not constitute a valid a-fortiori (being 'major to minor' positive subjectal); but would needs be read as a mere conjunctive statement "the righteous (who has much credit) will be *rewarded* here on earth, and even the wicked and the sinner (who has little credit) will be so *rewarded*."

Judging by its use elsewhere, the language (***hen/af***) favors the former alternative, namely the statement's interpretation as an a-fortiori. The word *ki* here serves to signal the tacit predicate of the conclusion (added in brackets), equating it to that of the premise.

People prone to theodicy (like Jeremiah: 'wherefore doth the way of the wicked prosper?' etc.) would tend to doubt the empirical veracity of this statement, however interpreted; but one can always argue back that only God really knows men's deepest motives (as the next argument indeed affirms) and the relative values of all their deeds, and therefore

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83 However, the truth of the first two propositions is open to doubt. This is made evident if we apply similar reasoning to humans and say "he who designs an airplane, can he not fly?".

His empirically apparent judgments might well be fully justified, however contrary to our expectations. The rebuttal is perhaps too simplistic, which is why appeal by theologians to a fuller accounting including life after death (and for some, previous lives) is usual.

Indeed, we find the Malbim (R. Meir Leibush ben Yechiel Michael, Rumania, 19th Cent. CE), with reference to this verse, commenting that while the righteous man tends to be made to pay for his sins in this world and to be paid for his good deeds in the next, the wicked man reaps his rewards in this world and is deprived in the next[84]. However, while this may well be true, I wonder whether it is logically implicit in the proverb under scrutiny. For, note well, the minor premise specifies recompense *on earth*, in which case *by the dayo principle* the conclusion must similarly be limited. As far as I can see, we cannot strictly, without illicit process, extrapolate further, to a world beyond.

I want to add, here, that I have all too often noticed similar breaches of the sufficiency principle in other Talmudic and Rabbinic commentaries.

Proverbs 15:11. Solomon:

> "If (***ki***): hell and destruction are before the Lord;
> how much more (***af***): the hearts of the children of men [are before the Lord]?"

Here, the premise is apparently not signaled by an if-operator, while the conclusion is signaled by the word ***af***; but since both propositions are categorical (the latter with an explicit subject and an implicit predicate), the word ***ki***, which is normally an operator, would be redundant if viewed as part of the conclusion: it must therefore be viewed as the missing if-operator of the argument, more rightfully placed before the premise. (Alternatively, the argument might have been viewed as lacking an explicit if-operator, and *ki* as referring us to the absent predicate of the conclusion; or *ki* might have both functions. But see the next case.)

Malbim correctly construes this a-fortiori argument's implicit major premise, when he states: "The netherworld is far deeper, far more beyond sight and ken, than the human heart..."[85]. The inductive proof of this statement would be that most of us know a bit about the human heart and nothing at all for sure about the netherworld. Still, I want to make a general comment in this context, which I think is important.

While the *logical form* in which the verse under consideration is cast is indubitably a-fortiori, it cannot really be viewed as instructing a deductive process. Deduction, viewed very strictly, is inference from more-known contents to the less-known. In the case of our verse, the minor premise cannot be said to be *known by us*; rather, it, as well as the conclusion, are being simultaneously taught to us, presumably as Divinely-inspired. None of us non-prophets can claim to know what it is that God knows; at best, we have a general assumption that God knows everything, under which all particular statements made (whether or not logically ordered, relatively to each other, as premises or conclusions) are equally subsumed, in which case the inference involved is essentially syllogistic.

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84 P. 119.
85 *Ibid.*, p. 159.

We must thus view the whole verse as simply (from a logical point of view) a statement - that God will judge us, with full knowledge of our most inner thoughts, and may well send us to hell and perdition. The purpose of this statement is not maieutic, though outwardly cast in such form, but more practically homiletic, a warning to the unconverted or a reminder and encouragement to the converted: namely, that there will be a final judgment, etc. Religious literature, Jewish or otherwise, often indulges in such rhetorical techniques, giving preachments a maieutic appearance.

Proverbs 19:7. Solomon:

> "If (***ki***): all the brethren of the poor do hate him,
> how much more (***af***): do his friends go far from him?"

Same operators ***ki/af*** as in the previous case, for the same reasons. Note, however, that here the word *ki* has no other possible role to play, than the one we have here assigned to it, since the propositions are not only categorical, but wholly explicit; this justifies the similar position we took in previous such cases.

With regard to the content: one might point out that sometimes friends or even strangers will stand by you more than family. At least outwardly - in truth, their motive may not always be disinterested love for you, but for instances a desire to bind you to them out of gratitude, so they may use you in the future, or simply a role-play to satisfy their ego or to impress their peers with their charity or to effect a commercial transaction with God.

Proverbs 19:10. Solomon:

> "If (***ki***): for a fool to have luxury is not seemly;
> how much less (***af***): for a servant to have rule over princes [would be seemly]."

Same language and logical structure as in the previous case. Note, however, that the *relation* between the premise and conclusion is a bit hard to find here; perhaps it is merely aesthetic: just as the delight of a fool strikes us as distasteful, so the sight of a lowly man having power over his betters disturbs our sense of fitness. Supposedly, anyway, this is not a statement of intellectual arrogance, or worse still of aristocratic prejudice, but of moral concern (the joy of an unintelligent person is not *per se* ugly; and some 'princes' would certainly deserve to be ruled by their 'servants').

Looking further into the matter, I found a very interesting comment by Malbim, which convincingly elucidates the premise-conclusion relation. He points out that the fool is one who lets his soul be ruled by his body (in the pursuit of pleasure) - so viewing the minor premise, the reference to princes and servant in the conclusion becomes less of a *non-sequitur*[86]. However, in that case, premise and conclusion become two metaphors for the same thing, and the verse becomes a mere reformulation of the same statement, rather than an a-fortiori

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86 *Ibid*., p. 198.

argument. Perhaps we should focus on the question, why the reference to one 'servant' and many 'princes'? This would bring us back to the more socio-political interpretation of the conclusion.

Proverbs 21:27. Solomon:

> "If (***ki***): [even brought with a 'sincere' intent] the sacrifice of the wicked is an abomination;
> how much more (***af***): brought with a wicked intent [is it abomination]?"

In this case, as before, the key phrase *af ki* provides us with the if/then operators ***ki/af***. Note in the above statement how the first part of the premise and the second part of the conclusion were both tacit, but could be readily verbalized by imitation of each other's explicit parts - a sort of 'mirror effect'. It is obvious that the premise could not be an unqualified generality free of the clause we added to it, because then the conclusion would be included in it and redundant; as for the conclusion, it would clearly be incomplete and inexplicable without the clause we added to it, which also shows up its a-fortiori relation to the premise. Thus, though the given propositions seem categorical, they are implicitly conditional, one with a tacit antecedent, the other with a tacit consequent. They are formulated with a maximum economy of words, yet because of their symmetry none of the message is lost.

Jeremiah 12:5. God:

> "If (***ki***): thou hast run with the footmen and (*ve*) they have wearied thee,
> then (***ve***): how (*ekh*) canst thou contend with horses [and not be wearied]?
>
> and if (***u***): in the land of peace, thou dost [hardly] feel secure;
> then (***ve***): in the wild country of the Jordan, how (*ekh*) wilt thou do [feel secure]?"

These are two a-fortiori with the same thrust. The if/then operators of these arguments are respectively ***ki/ve*** and ***u/ve***, though in the latter case the *u* (=*ve*) conjoins and equates the two arguments and could thus be viewed as standing in for a tacit *ki*. Note that in the first argument, the premise is a conditional proposition without if-operator, though with *ve* as then-operator, and the conclusion has similar form though partly tacit. In the second case, the premise and conclusion are likewise conditional, though all their operators are tacit. In both cases, *ekh* is used rhetorically, as usual, to deny the ironically suggested strength or security.

Ezekiel 15:5. God:

> "Behold (***hine***): when (*be*) it was whole, it was not meet for any work;
> how much less (***af***): when (*ki*) the fire hath devoured it and (*ve*) it is burned, shall it then (*ve*) yet be meet for any work?"

Here, the operators of the argument as a whole are ***hine/af***. The premise is a conditional with *be* as if-operator, and no explicit then-operator; and the conclusion is a conditional proposition (with a conjunctive antecedent, accounting for the first *ve*, incidentally), whose operators are *ki/ve*.

Daniel 2:9. Nebuchadnezzar:

> "Thus (***lahen***): tell me the dream,
> and (***ve***): I shall know that you can declare its interpretation to me."

Here, the king's utterance is not in itself a *qal vachomer* argument, strictly-speaking (since the first statement is an order, not an item of information), but it testifies to an underlying thought-process which is *qal vachomer* in form. The argument is obviously 'if my advisors are capable of telling me what the dream was, then they are skilled enough to tell me what it means.' For this reason, an if-operator is lacking, though we may take it to be ***lahen*** (cognate to the by now familiar *hen*), since this is the word the king uses to express his precondition; likewise, we may consider ***ve*** as the then-operator of the argument, though in the king's statement it refers to the mental consequence in him of the satisfaction of the precondition he set.

4. Rejects.

Finally, some comments concerning cases which might superficially be interpreted as a-fortiori, but which on closer scrutiny fail to make the grade for one reason or another.

Concerning 2 Chronicles 32:15. Sennacherib, king of Assyria (through his messengers) says:

> "For (*ki*): no god of any nation or kingdom was able to deliver his people out of my hand, and out of the hand of my fathers;
> likewise (*af*): therefore (*ki*), shall your God not be able to deliver you out of my hand."

The first statement is based on enumeration of past Assyrian experience; the second statement is an application of the same predicate to a new subject, Judah's God. The argument is therefore essentially inductive, going from the relatively particular to greater generality, and then back down by subsumption (eduction or syllogism) to the new case. It is not an a-fortiori argument; to have this form, the argument would need as major premise a statement that some of the gods of the already defeated nations were superior in power to the God of Judah, and no such statement seems even implied here.

Yet the argument gives an impression of being a-fortiori, because it uses the characteristic *af ki* terminology (actually, this sentence uses the word *ki* twice, once redundantly, with intent to stress that an inference is involved). Perhaps the speaker wanted to give it more force, to scare his audience into submission. Note that a bit further on, in verse 17, essentially the same statement is repeated using another terminology, *ken/lo*; but there the style is clearly not a-fortiori.

Note also: 2 Kings 18:23-24, and its repetition in Isaiah 36:8-9, might at first glance be construed as a-fortiori in style. But try as I might, I have not been able to make a clear a-fortiori argument out of it, however artificial and logically improbable. If we suppose the speaker is arguing: 'Even if I give you two thousand horses, you would not be able to set riders upon them; how then (*ve-ekh*) can you hope to defeat even the least of my master's captains?' - we are hard put to explain the rest of the statement about 'trusting in Egypt for chariots and for horsemen.' The text is unclear, even viewed simply.

Lastly, with regard to Esther 9:12. Ahasuerus says:

"In (*be*) Shushan the capital, The Jews have slain and destroyed five hundred men and the ten sons of Haman;

in (*be*) the rest of the king's provinces, what (***meh***) have they done?"

This is one of the ten *qal vachomer* arguments recognized by *Genesis Rabbah*. As the Rabbis see it (thus for instance, I read somewhere, does Malbim on the basis of the Talmud), the king was surprised and angry that Esther's People, the Jews, had been so threatened that at least 500 anti-Semites were found; this viewpoint would help explain why the king next asks Esther what else she requests of him (he was concerned, he evidently felt somewhat responsible).

But frankly I have some doubts as to the sentence's status as a *qal vachomer* argument. For a start, its language is *sui generis*: I have not found another a-fortiori signaled by the word ***meh***. This in itself is not proof, of course, for the linguistic habits of that place and time may have been distinctive (and I may well have missed other cases). And indeed, one can easily imagine the statement (perhaps accompanied by an up and down wave of his open hand[87] and an emphasis on the *mah*) as signifying that the king expected more people to have been killed in the rest of the kingdom. We of course know from verse 16 that in fact as many as 75,000 were killed elsewhere.

But the problem is not the king's expectations, but whether *an argument* (and specifically *an a-fortiori*) was at all formulated (let alone, whether or not correctly). Given the premise, one could reasonably equally well expect that less people were killed elsewhere. One can as well conceive that most of the Jews' enemies were in the capital, as conceive that they were proportionately (or even more) frequent in the rest of the empire, according to our view of the sociological profile of anti-Semites. Thus, the king's question may well have been no

[87] This is not just a quaint Israeli gesture, but in my view signifies the act of *weighing*, whence 'how much?!'

more than an open question; and indeed, there is no indication within the text that his statement was other than a simple statement of amazement and curiosity.[88]

[88] I have by chance found (this is June 1998) yet another a-fortiori: Jonah 4:10-11, which goes to show, as I asserted earlier, that there are probably still more cases than those indicated thus far. This argument is uttered by the Lord, who says: "Thou art concerned about the castor oil plant, for which thou hast not laboured..., and should I not be concerned for Nineve, ..." The expression ***va****ani* ***lo*** (and should I not) is obviously similar in function to *halo*.

7. WITHOUT PREJUDICE.

In this essay, we consider some of the psycho-social factors underlying religious modes of thought.[89]

1. Taking a Dilemma by its Horns.

As soon as one begins to express opinions on issues related to religion, one is confronted with an exceptional dilemma, not found in other fields. The first horn of this dilemma is a possible antipathy of the religious camp, Rabbinical or lay; while its second horn is a possible discredit in the secular camp, academic or amateur. It is a case of "damned if you do and damned if you don't", very likely without a fair hearing either way. The philosopher of religion has to be attentive and find some way to take this dilemma by the horns.

> I have chosen, here, to leave a certain ambiguity in the term 'secular', letting it range from a neutral position with regard to religion to the more ideological anti-religious position, which is more accurately called 'secularist'. This is, I think, justified, insofar as individuals themselves are not always clearly positioned, but may start from a purely secular perspective and travel over to more decided opinions, or vice versa. Also, of course, being religious does not normally imply rejection of all secular opinions.

For the religious, the accumulated beliefs of the orthodox Jewish religion are unshakably true; and the (oft inspired) intellectual processes which have brought about this accumulation of beliefs from an initial Divine revelation at Sinai are not open to any doubt, at least no longer so ex post facto, once their result has become established with general approval of close to contemporary rabbinical authorities. The function of scholarship, here, is

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[89] These reflections arose in the following circumstances. Back in late 1991 or early 1992, after a couple of months of writing, I had a first draft of some 60 pages, which I distributed copies of to a few local Jewish academics and Rabbis. Some declined to read it; some found it interesting, and one had a negative reaction. The latter was Prof. Simon Lauer, to whom my typescript had been sent by Dr. Esther Starobinski of the *Société suisse d'études juive*. I do not know how much of it he actually read, but he (I was told) rejected it as an 'apologetic' work. I was at first rather upset that he had not noticed and appreciated the constructive elements in it (in particular, my original theory of a-fortiori argument!), but after a while I had to admit that his criticism was in many respects appropriate. I wrote this essay to clarify the issues in my own mind, and as a result resolved to be more critical. More precisely, I resolved to be as *honest* as possible, neither pandering to the Jewish religious establishment nor to academia, but admitting difficulties openly wherever I found them and trying to resolve them as fairly as possible, with neither religious prejudice nor secularist bias; I would simply record a sincere search for truth.

essentially study: retracing steps previously traced; those before knew it all, those after must try to recapture this knowledge.

For the secular, ideally, any belief must be subjected to independent and fair-minded scrutiny and appraisal, both empirically and rationally; and any belief may be abandoned or be adopted, according to the faults or merits that the investigation may uncover in the light of all available information and insight. This is an ideal image of the secular pursuit of truth, because in practice of course different people (or a person at different times of his/her life) may be more or less capable of developing within themselves and sustaining the right attitudes, more or less aware of available information and logical methods, and more or less gifted with native intelligence.

These two epistemological approaches are significantly different; yet they also have notable common aspects. For the religious, no single factor in the body of received beliefs can be doubted because that would open the whole structure to collapse. For the secular, all reviews and changes in beliefs are in principle acceptable, no matter how radical, provided of course such proposals are convincing. In both cases, there is an implicit threat, a controlling fear, accompanying any pronouncement: in the former, excommunication or untold Divine punishments, in the latter, ridicule and professional exclusion. But the two approaches also make some similar demands on the human intellect: demands of effort, demands of research and understanding; and they also share a great many logical processes.

There doesn't seem to be a way to really reconcile these approaches. Albeit their common grounds, they are apparently on the whole radically opposed principles: there is a limit and a reticence in the religious, an overriding faith in received tradition, and an ultimate skepticism in the human mind; the secular optimistically believes in the powers of free thinking, and looks with suspicion on any prejudicial attachments to particular data or interpretations.

I would like here to propose certain meditations on Truth, which may help a little to resolve the issues on both sides.

a. For the religious.

Faith is an attitude of the human Will in the face of an uncertainty. It signifies an assumption of truth beyond the recommendations of empirical/rational judgment: where normal cognition leaves blanks faith is free to step in, and frequently faith steps in *against* the probabilities conceived by such uncommitted judgment. Thus, faith is a measurable concept (roughly, intuitively): it is a will to believe which is inversely proportional to empirical/rational judgment. If the probability that some proposition be true according to experience and reason is say 90%, then the faith that it is *not* true (which has going for it only a 10% probability) needs to be proportionately strong. It does *not*, obviously, take much faith to adhere to a belief which reason and experience already overwhelmingly support.

It would seem to me to follow that religious people should welcome the challenges posed to their faith by secular thinking. To maintain one's faith by staying or being kept in ignorance, is not therefore a sign of piety, but a sign of weakness in one's faith, if not simply of intellectual laziness or stupidity. Blind fanaticism is not a demonstration of faith, but a use of force; forcing oneself or being forced by others to adhere to some belief has no place in the pursuit of truth. A strong, confident faith is generously open and unafraid of challenge: like

true love, it holds firm over the long term, unmoved by the appearances of the moment, always grateful to receive new information and insights, always searching for solutions to problems.

The judgment of any proposition, any item of knowledge presented for consideration and appraisal, is *like a court trial* (individual and collective), and the person(s) taking up this job is/are judge(s), court officers. It is like the judgment of a person: there is an ethic to it, a morality is necessary. This ethic is well documented in the Torah (see for instances Exod. 23:1-9, Deut. 16:18-20, also even Deut. 25:13-15), and as a consequence in the Talmud, and in Rabbinical writings. Witnesses or judges may have some intuitive opinion of the outcome of the trial, but in their roles within it they have a moral duty to maintain an absolute open-mindedness and will to truth. Truth, we are taught, at all times requires:

- treating litigants equally, without prejudice in the face of their poverty or respectability, their exclusion or inclusion in an in-group, or their virtue or vice beyond the issue treated;
- being uncorrupted by fear of reprisal or promises of reward, and unmoved by peer-group or public opinion and pressures;
- finding honest and fair witnesses, and diligently inquiring into their testimony, as well as giving an equitable hearing to all parties;
- distinguishing between hard and circumstantial evidence, and judging with knowledge of the law and its procedures;
- using the same scales and standards for all (under the law); intent on doing justice, and on neither condemning the innocent nor failing to condemn the guilty.

All this applies as well to the judgment of *ideas* as to that of men, for is not the judgment of men ultimately determined by the judgment of ideas? But what distinguishes theoretical research from practical jurisprudence is that ***in the general pursuit of knowledge, the trial never comes to an end, so faith is never really endangered***. Even so, one is duty bound to keep track of developments as they occur, and not just shut one's mind: there are almost always valuable lessons to be learned.

b. For the secular.

The challenges for the secular are different. It is all too easy to be moved by an anti-religious prejudice, which, as much as a pro-religious prejudice, may distort one's perceptions and conceptions of truth, through the desire to be unbound by the restrictions and duties which religion may eventually impose on one. Often, the secular thinker, much as the religious one, is subject to unadmitted subconscious motivations, and uses the forms of scientific thinking but without its essential spirit, to arrive at preferred results which serve to justify desires. What is needed in such case is introspective lucidity and honesty. For the secular, as for the religious, the basic epistemological requirement is attitudinal.

In certain academic circles, a distinction is made between *apologetic* works and *critical* works. An apology for religious beliefs is usually rejected offhand by secular academics, without serious consideration or evaluation, as inherently biased and unscientific, whether traditional (old) or original (new). For their part, religious people usually avoid critical voices and writings, sensing in them provocation and unfair negativity. One could equally well view apologetic works as "critical" of secular trends, and critical works as "apologies" for atheism

and immoralities. From the point of view of philosophy, atheism is as problematic as religious belief: given ordinary cognitive means, neither is capable of absolute proof or disproof. Making intimidating accusations, one way or the other, does not serve the cause of knowledge.

The scientific mind, in the broadest and purest sense of the term which refers to any attentive, logical and intelligent pursuit of knowledge, is scrupulously fair. Fairness, or evenhandedness, is considering all theses with equal care, if not enthusiasm. A secular thinker is duty-bound to take into consideration the apologetic explanations of the religious, and a religious thinker likewise for the criticisms and doubts and proposals of the secular. If one is presented with two or more hypotheses, they must all be equally carefully analyzed and tested within the widest possible framework of thought and knowledge-context[90]. One may not just concentrate one's own pet theories, and ignore or put-down all others offhand. At least, if one is content to pursue one's own specialized studies, one should not comment negatively on others' fields; but mutual communication and transparent integration is preferable.

In both cases, the religious and the secular, the basic epistemological error is that of ***rushing to judgment***. The religious, faced with criticism, rush to judgment and condemn the speaker in their fear that their faith will be shaken, if not shattered; it is hard to be religious (or anything which calls for sustained discipline) without firm certainties and deep enthusiasm, one doesn't get far. The secular, faced with apologetics, yawn with boredom or get cold with hostility; their mind is usually made-up already, final judgment was passed long ago. Of course, each side would claim that its judgment was quick rather than rushed; quick - as when one quickly spots the errors in a stupid or ignorant thesis.

The error of the religious is to forget the infinity of knowledge: new data, new insights, may always eventually reverse previously held secular beliefs. As for the secular, they forget that a proposition which seems far-fetched and unlikely may still in the end turn out to be true; a low probability is still a probability. These are essentially one and the same error, which calls for an effort to keep going however things look to be thus far.

Knowledge, all knowledge, knowledge of truth, requires observational skill, logical powers, and a great deal of imagination; but, most of all it requires the right mental attitudes: *intellectual honesty and intellectual courage, i.e. intellectual integrity*. Whatever one's technical abilities or intelligence, it is ultimately one's *will to truth* that counts most, and for that *openness, patience, and plain hard work* are necessary. Knowledge is not the mere manipulation of data, ideas or symbols, but primarily a moral act. If its goal is superiority or privilege, it will soon transmute plausible reasoning into a "whitewash job" or a "hatchet job". Knowledge as a sword, as source of power and authority, is not true knowledge. True knowledge is free, yet altogether sustained by a moral will; it has no credibility otherwise, descending to the level of ideology and slogan.

Most of all, for any individual, what the pursuit of truth requires is a personal commitment to *realism*: the conviction that *facts are facts*, that wishing they were otherwise or turning one's eyes from them will in no wise change them. If something I believe in, whether

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[90] To give an example, an archeologist finding mention or pictorial suggestion of the Adam and Eve story or of the Flood story in cultures preceding the Torah would be wrong to infer that the Torah versions of these stories are derived from those other cultures. The Torah nowhere denies that peoples other than the Hebrews may have remembered those events, and it is quite conceivable that the memory was carried by many different families.

of spiritual significance or whatever, is at all false, I want to be the first to know it; ignorance is not bliss, or not a very respectable form of bliss.

Realism demands transparency ("*glasnost*" in modern parlance); for problems to be solved, they must be brought *out into the open* and consciously dealt with, rather than waved-off or covered-up. And having come face to face with the difficulties, one should not respond to them with panic, assuming the worst, throwing the baby out with the bath-water; but coolly, considering the pros and cons with a level-head, looking for credible resolutions.

> It should be noted that the basic issue is not tradition versus change, but thought versus thoughtlessness. Whereas in the old days, conformism rhymed with immobilism, nowadays, especially in America, it rhymes more with trendism. Before, people would unthinkingly submit to institutional authorities, nowadays they unthinkingly follow, hither and thither, slick, media-generated, flavor-of-the-month panaceas. Today's population, for all its veneer of freedom from authority, is really little different from yesterday's.

2. About Revision.

Of course, there is no denying it, the word 'critical' need not have a pejorative sense, connoting bias, but may signify a commendable refusal to be fooled or misled. And, indeed, 'apologetics' (especially, you'll concede, those of another religion or sect than your own!) are often, if not in most cases, artificial constructions, whose purpose is very obviously to give a mere illusion of explanation or proof, and bypass problems or sweep them under the carpet.

It must be admitted in this context that a decision-maker in Jewish law (as probably in any other religion's law), as well as any scholar or student in the field, may allow his judgment to be distorted in various ways. The possibility of such distortions does not imply that they occur in all cases, or ever; but it is well to be aware of these possibilities, anyway, in the name of honesty.

a. The first issue is one's **scale of values**. In religion, factual truth, whether in matters of principle or with regard to the historicity of stories, is not necessarily the paramount value. One may well consider that playing some fancy role or making a certain pious statement will advance the cause of the religion, and uphold that pose without having evaluated its factual truth or, worse still, while vaguely and subconsciously aware that it is questionable or even tenuous. The problem here is that the religious frequently confuse "good" with "true", or more precisely, they believe that what seems to them good has got to be true; and accordingly dismiss as false any idea which seems to them bad.

Such a premise is unfortunately epistemologically unsustainable, for it is impossible to predict at what stage of its development truth intersects with goodness; the event may not occur at a superficial level, but may actualize in a much later stage of the proceedings. Some truths are at first unsavory, but later one realizes the depth and maturity they taught us, and the improvements in one's character they caused in us, as well as the broader and more accurate world-view they generated in one. Conversely, simple faith or rigid fanaticism may give one an initial aura of moral achievement, but in the long run their only residue may be a stifled mind out of contact with reality, a rigid person, a wasted life.

b. Another pitfall is that of **oneupmanship** (in French, *la surenchère*). In order to be accepted, respected or admired by one's peers, one may rather easily judge issues with a leaning towards severity (or, more rarely, leniency). In Judaism, the more difficult your level of observance, the more virtuous you seem[91]. The ability to judge leniently is a luxury permitted only at the higher levels of the hierarchy, when your severity credentials are well established, and you can now afford the snobbery of emulating Hillel, adding further veneer to your appearance of virtue.

Whereas in the preceding issue (scale of values) the error may stem from excessive idealism, in the case of oneupmanship the motive is essentially more selfish. It is a very human desire to fit in socially and climb the social ladder, under the guise of spiritual responsibility and spiritual pursuit. It is selfish, because, by imposing on other people unrealistic norms of behaviour, it may cause them serious hardships. The problem is inherent to a closed system of knowledge like Judaism (but not only Judaism): the only way to really have an impact within it, is literally to add to it, which means for the most part to make it still more stern, since all relaxation may be viewed as a retreat, and as evidence of personal decadence. The intellectual who wants to flex his mental muscles in public within the system is therefore virtually bound to engage in oneupmanship!

I like to think that all responsible and sincere Jewish decision-makers were and are aware of such pitfalls, and had and have the power of introspection and psychological acuity needed to avoid them. These are probably in the majority, granting that "you can't fool all the people all of the time". Still, perhaps some fail to avoid them. But we must also admit that unorthodox Jewish religious thinkers (Conservative, Reform, etc.), and likewise secularist thinkers, are equally subject to similar pitfalls, though in opposite directions, and also need to look into their own souls and consider their own motives and honesty. In all fairness, some of those also perhaps fail to avoid distortions.

The reader should not be one-sided in his scrutiny and evaluation, but see that fallacious and shallow thinking is found in all camps[92].

In any case, I say: truthfulness is a mark of *human dignity and decency*. There is, in normal circumstances, no beauty, no purity and innocence, no saintliness, no honour, no kindness, in faking truth. There are always people around for whom truth is not an absolute and not an indispensable value. They will twist facts or stretch inferences, invent legends and make myths, coat their lies with sugar, misuse their credit, *or passively accept such behaviour from others*, for all sorts of motives, positive or negative, noble or depraved, none of them nice.

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91 I found a good example of this oneupmanship in Bergman (p. 120), who describes R. Eliahu Mizrachi as amazed that Rashi initiates a certain interpretation, with reference to Num. 30:2, and quotes the former as saying: '...since only the Sages of the Mishnah, who received these explanations as traditions, are authorized to do so and no one else, not even the early *Geonim*, and certainly not their successors.' The way I see it, these men are riding on Rashi's solid reputation as an orthodox commentator, and establishing their own credentials by criticizing him for insufficient commitment. In the case of R. Mizrachi, the attack is 'original'; in the case of R. Bergman, it is just an echo: but for both the psychology and social goal is the same.

92 A book I enjoyed recently and recommend, concerning the specific field of Bible study was *Exegetical Fallacies*; it is written by a Christian scholar, D. A. Carson, and refers mainly to the Christian Bible, but his remarks are incisive and of general value, showing many of the errors both would-be defenders and would-be critics of Scriptures can commit.

Vain ego-trips, selfish willingness to sacrifice others for one's ends, the refusal to acknowledge one's errors and admit facts or uncertainties, the willingness to draw unwarranted conclusions from doubtful data, wishful thinking, blinding oneself and blinding others, weakness of character, conformism or cowardice, the inability to say 'no!' or 'enough!' for fear of rejection or 'yes!' for fear of the action-obligations implied - these are some of the "human, all too human" possibilities in every camp, the strictly or weakly religious, the Jewish or non-Jewish, the non-religious or anti-religious, the educated or uninformed, wherever.

How do I know these things? Simply because I have often caught myself doing them or tempted to do them. No one has a monopoly on intellectual virtue or vice; we must all always try to be careful.

One can well see why most Rabbis (Maimonides was a notable exception, but his efforts in this respect have not been generally appreciated, to say the least), have such a fierce antipathy to philosophy. Their reaction to it is very similar to their reaction to physical nudity or to immodest sexuality. 'No holds barred' rational reflection bares all the faults and weaknesses of dogmas, and tends to shatter faith. In their view, doctrines may be subjected to a certain amount of scrutiny; but there are limits to respect.

For all that has been said so far might well be cheerfully admitted (in principle, though perhaps not always in deed) by wholly-secular thinkers, or by reform-minded religious ones; but frankly it would hardly be accepted with all its implications by the less modern-minded orthodox religious establishment. Because the implications are clearly that some past Rabbinical decisions may have been faulty or weak. This does not tally with the veneration they are all held in, which effectively credits them with a sort of unassailable infallibility.

The explanation put forward to counter such inferences is that the religious leaders of the past were beneficiaries of a *privileged level of consciousness*, with the capacity for insight into percepts, concepts and logical relationships, inaccessible with ordinary cognitive means. In Biblical days, this was *hanevuah*, prophecy (at various levels); in Talmudic times, it was *ruach haqodesh*, translated as the holy spirit (also considered as having various degrees); and thereafter, a more prosaic but still Divinely-favoured intellectual acuity, reserved for the pure and obtained by deep study of the Talmud, call it *chokhmah*, wisdom.

Thus broadly put, the explanation is effective, because it changes the equation considerably. A new epistemological factor is thereby introduced into the discussion. The criticisms previously considered were applicable under the assumption that normal perceptual, conceptual and logical cognitive equipment are the common lot of all humans, though their database and intelligence may vary; and therefore that all are subject to the same methodological pitfalls, and are to be evaluated in their judgments by uniform standards. If, now, this assumption is open to doubt, anything goes.

Let us both attack and defend this viewpoint. It is not in principle inconceivable (we can refer to variations in levels of consciousness in the animal world); it is just difficult to define, delimit, and demonstrate. Anyone might claim a privileged or supernatural consciousness, and indeed adherents of many religions (not just Judaism) do and have done so: how should an individual without similar claim know whom to believe? There is no conceivable standard, other than strictly checking explicit predictions; this may apply to precise concrete events, but many abstract pronouncements are broad-ranging and unverifiable.

Furthermore, in Judaism (at least) the recipients of such special dispensation (prophets and sages) are all placed far in the past: out of reach of any present verification of their historicity or of the historicity, timeliness and exactitude of their pronouncements, safe from any controlled experiment. It is all too easy to project whatever one wishes into the past, to ex post facto reorder events as one sees fit, to invent legends, to find in subsequent events the concrete realization of vague and ambiguous earlier predictions. How reliable are word-of-mouth or even written traditions, anyway? Witnesses, even assuming they witnessed something, may have been gullible, superstitious, easily fooled, because lacking scientific methods and knowledge.

Let me make this clearer. We have, here, a theory that there are two categories of knower: the Divinely-inspired, like Moshe Rabbenu (to take an extreme case), and the common, uninspired Jew (among others). For a man like Moshe, the epistemological problem of Revelation is simple enough: being a present and direct recipient, he has only to have faith that what he has heard/seen was indeed the word of God; and supposedly that attribute of the message is convincingly carried within it, as an inherent and undissociatable component of it. (Of course, we may well say that Moses must have earned this great gift, just as we say that a man born rich must have had good 'karma'.)

But for the common Jew, who may sincerely try to think things through, the issues are honestly much more complex: his source of knowledge is indirect, just hearsay; he has not himself experienced God, nor any phenomena he can identify unequivocally as communications from God; living long after the Sinai events, he has no proof other than a document (the written Torah) and a tradition (the oral and written culture surrounding the Torah) that these events ever took place, that Moshe ever existed, and even if so that the subsequent transmission of the data and the interpretations by umpteen generations of teachers was accurate, and neither distorted, nor censored, nor amplified.

Thus radically distancing oneself from the issues, one can well see how difficult is the common lot of human beings in the matter of religious faith. People who in all humility have trouble believing in anything might well be excused, with much understanding and compassion. And even those who need to and are willing to believe, are presented with very difficult choices between competing scenarios and alternative doctrines; it is hard to blame them if they betted on 'the wrong choice' of faith, and it is frankly difficult to believe that they could justly be damned for it. And as for those who made 'the right choice' of faith, whatever that be, they are surely highly to be praised, for their epistemological task was much more difficult than the task of anyone who has been blessed with inspiration.

Past Rabbinical 'deciders' (*poskim*) are claimed today to be effectively infallible, if not implicitly omniscient, and there are supports for this view in the Talmud itself. But this claim does not seem compatible with the differences of opinion between these deciders recorded throughout the same document, and through later history. A general principle is enunciated, to the effect that these and those are words of the Living God (*elu vaelu divrei Elokim Hayim*); and that the Torah has 'seventy facets', all equally true even though seemingly contradictory. But such a statement is more an expression of faith, than a detailed practical solution to the evident problem: some Rabbis won the debate, some lost: that is fact.

How to evaluate the defeats? Was it perhaps a momentary breakdown of privileged consciousness; in which case, how come the Rabbis concerned were not aware of this

breakdown, and continued to maintain their erroneous positions? If they could not tell the difference, how could they claim privileged consciousness at all; and if they knew their positions erroneous, what was their game in maintaining them? In truth, the *inductive*, rather than mystically privileged, nature of their thought and debate is very evident.

But the critique can be pushed further: there are cases where errors surface much later. Consider, for instance, the Midrashic claim that there are ten a-fortiori arguments in the Tanakh; or its claim that the sex of children is unknowable before their birth. For close to two thousand years, such pronouncements were claimed to be infallible. Now we find that there are more than ten a-fortiori arguments in the Tanakh, or that modern medicine can predict gender[93]. Sure, we can always try to water-down the original statements to make them more or less compatible with new findings, one way or another; but the fact remains that for a score of centuries they were taken literally by countless Rabbis! What then happens to their credibility?

However, if now we take the 'revisionist'[94] position that the issue need not be "all or nothing", and accept reluctantly that *some* Talmudic and Rabbinical (and even, more extremely, Biblical) statements may be erroneous: *where do we draw the line?* If we do not admit everything, must we perforce reject everything? Perhaps it suffices to say (cautiously, generously): admit whatever is received from tradition, until and unless it is proved wrong and must be rejected. We actually find examples of this approach in Rabbinical discussion[95].

This is, after all, the way with empirico-rational research: appearances are accepted as reality, until if ever they are shown to be illusory. We do not reject *all* knowledge just because *some* of it has turned out to be wrong after being long believed in. That would be self-contradictory, because it would require rejection of the rejection. Therefore, it is axiomatic that *some* knowledge is right, though that axiom does not specify just *which*. However, in the case of specifically religious knowledge, no such clear-cut epistemological axiom can be constructed.

> Our only appeal, it seems to me (and many people throughout history and in all cultures have had a similar impression), can be to the insistent *intuition* that the existence of Existence as such, of a World, of the complexities of Matter, Life and Consciousness, is an utter *surprise* (sometimes mixed with joy, sometimes with dismay), an ineffable and unfathomable mystery, which can only be somewhat toned-down to our satisfaction by the assumption of God, even though such an assumption itself posits even greater mystification.
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> And once God is thus acknowledged, then the *attente* for a communication of some sort from Him, an explanation and a guidance, if not individually then collectively, by whatever means, would seem necessary and inevitable. To me, at least; that some people lack such expectation would not prove its vanity, for not all people stop and reflect much, and even those who do might well be moved by

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93 Currently through 'echography', if I am not mistaken; but more sophisticated methods are on the way.

94 It should be clear that I use this word quite innocently, without intending any political connotation (with reference to Zionism, or to Holocaust History).

95 An example of such inductive change is given by Mendell Lewittes, in *Principles and Development of Jewish Law*: "after quoting statements of Rashi and Tosafot, he [Moshe Sofer, known as the "Hatam Sofer", a major Halakhic authority, 1762-1839] writes, 'all this was said only according to their understanding (of the process of menstruation). However, begging their pardon, *they are not correct in what they say, for the truth is...* according to the scholars and surgical books... and I have in front of me other books from expert physicians who are not Jewish.'" (italics mine). That 'begging their pardon', by the way, is a reflection of the intimidation weighing on him, his fear of rejection for unfettered thought; yet he had the integrity to pursue truth and add 'but they are not correct, etc.'

incidental considerations. This expectation and need in turn opens human beings to religion, all sorts of religions; and here, their ways part to varying degrees, and the epistemological issues multiply. Some thinkers answer them enthusiastically, some skeptically, some carefully.

Even if anyone seemingly settled some of the issues, what would be achieved? No more than one more religion, one more sect. Some people would become more religious or less religious, this way or that way. But certainly (*contra* Nietzsche) religion will never die; there will always be Jews and others who uphold religious beliefs. And likewise, the spirit of independent thought, which is one of the aspects of human greatness, will surely live on; and people will continue to ask questions and do research.

In any event, no side can or should, cavalier fashion, ignore or dismiss the other(s), or be satisfied with a preconceived and shallow traditionalism or modernism. And it is good that the debate continues, with mutual tolerance and respect, because it is a dialectic of value to all, reflecting the psyche and destiny of humankind.

Knowing all this, and having said all this, I do not think that any final and thorough resolution of the big issues is ever possible, one way or the other. The task is impossible: nothing much can be *firmly* proved or disproved. Nothing much is ever likely to change at the level of deep theoretical questions. In practice, everyone must still always make a personal choice, and take a gamble on one doctrine or another, be it a belief-system or a pattern of behavior. Yes or no, this or that, day by day or in gradual or sudden ways, choice is inescapable. In any case, ultimately, choices are made more with existential considerations than on theoretical grounds.

So let us remain content, I say, with a simple faith (constant, but devoid of arrogant pretensions), and enjoy the (doubtlessly very limited) illuminations stemming from questions and investigations in pursuit of truth.

3. Changes in the Law.

The Judaic tradition, which includes the Halakhah (strict law, the ‘unvarying’ core of Jewish law), the *minhagim* (subcultural law, varying from community to community), and the Hagadah (non-legal stories and explanations), tries to make room for and fit in every statement and interpretation made by all the influential Rabbis. If such a Rabbi contradicts himself, or another equally important Rabbi, all the propositions involved are given credit, and viewed as different aspects of the tradition.

It is all claimed to be Torah, “*leMoshe miSinai*,” passed on orally if not in writing. Yet this claim is gently balanced and toned-down by the paradoxical story of Moshe *Rabbenu* being momentarily transported to the time of R. Akiba, and sitting at the back of one of the latter’s classes, and not recognizing or fully understanding what is being taught, even though it is all being presented as a faithful transmission of Moshe’s teachings.

But the tradition has a history, which can be traced to some extent, and this history displays change - laws added, laws removed, laws changed, new minhagim, extinct minhagim, new texts, new influences, lost texts, extant texts losing their influence, new interpretations,

new viewpoints, people no longer convinced by certain claims or explanations, people with new values and emotions unmoved by past arguments or appeals, and so forth.

Can one honestly maintain that this near-infinity of data was already actual, if only orally, at Sinai? It is not *inconceivable*, since: (a) supernatural means of data acquisition and transmission are not excluded, and (b) a whole people, that is a culture, was involved, and (c) what is possible now was possible then (though today's collective "memory" is mostly in writing, whereas in those days it was mostly not so). But it does not seem to us very *likely*, given the historical facts as we know them.

Granting the existence of real change in Jewish law, evidently some of it has been in the direction of leniency (e.g. the *prosbol* or the interruption of Temple sacrifice), and some in the direction of severity (e.g. the abolition of male polygamy or the increased volume of daily prayers). With regard to changes in the direction of leniency, some religious people might well regret them, and even yearn for more restrictions and duties, regarding them as opportunities for "performing mitzvot", i.e. for serving God. But frankly most people nowadays would rather feel relief at any lightening of the burden, and furthermore look askance on any changes in the direction of severity.

From a philosophical perspective, one might wonder at such change, even in a changing world. Is it a change in the price of heaven? Perhaps some generations are further away and have to pay more to get up there. Is it alternatively a difference in mission? Perhaps some generations are weaker, and therefore can be entrusted only with a relatively low responsibility.

Whatever the reason for it, such change is clearly not inconceivable. There is no logical reason why the law has to be immutable, just as there is no logical reason why all creatures or all peoples or all individuals have to be subject to the same law. The formal logic of ethical propositions allows for all quantities (general, particular, singular) and all modalities (unconditional, conditional; constant/permanent, occasional/temporary). It sets no preconceived standard of universality and invariability.

8. INITIAL IMPRESSIONS.

In this chapter, we shall make some preliminary, general comparisons between some of the propositional forms and logical processes used in Biblical, Talmudic and Rabbinic literature, and those found in modern, secular scientific thought[96].

But note well that these initial reflections were written before engaging in formal analysis of hermeneutic principles. The latter analysis, as we shall see in subsequent chapters, considerably changes our perspective[97].

1. Methods and Contents.

The present study relates primarily to issues of *method*, and not to issues of content. Our focus is not philosophical, in the sense of metaphysical, nor scientific, in the sense of relating to special sciences like cosmology, biology or history. Our approach is rather *epistemological*, to compare the methodological aspects of religion and science, and take note of similarities and differences.

The traditional view of the development of Jewish law, which we traced briefly in the opening chapter, suggests that it is mainly a *deductive* enterprise. The laws were derived from the Torah, which was revealed by God through Moses to the Children of Israel at Sinai. These laws were either explicitly given in the revelation, mostly in writing, partly orally, and then faithfully transmitted; or later inferred in accordance with strict hermeneutic rules, by the religious authorities charged with this responsibility in direct line since Moses.

> We are not (to my knowledge) told by Jewish tradition **precisely how the first *Sefer Torah* (physical scroll of the Law) was written**.[98]
>
> Did God orally dictate it all word by word to Moses, and if so, out loud or in his head? Or did God visually display text for Moses to copy down, and if so, externally or internally? Or did God take control of Moses' hand directly, without passing the message through his mind and asking him to

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96 Using the terms "secular" and "scientific", here, without implying such thought to be at the outset or inevitably anti-religious (secularist). We may include under the same broad category, not only the natural sciences and history, but also philosophy at its best (not all philosophy is well thought out; however, most philosophy has a contribution to make, however inarticulately expressed), and any aspects of the humanities which obviously qualify.

97 The present essay's general conclusions are rather over-optimistic; but the specifics on which it bases such conclusions are essentially correct.

98 See Lewittes, p. 35. He quotes the Rambam as saying "... though exactly by what method is known only to the recipient, Moses." In the Talmud, *Gittin* 60a, two possibilities are floated, one, that Moses wrote the Torah down when it was communicated to him, another, that he memorized it and wrote it all at the end of his career.

transcribe it? The latter hypothesis seems more likely, at least in certain passages *about* Moses, such as those which declare him the humblest of men. The hypotheses of dictation are suggested by Biblical passages like Exod. 17:14, "write this... in the book," though one may wonder why such orders would have been given in specific cases if they were the general rule[99]; video display is suggested by, e.g., Exod. 25:40.

In any case, the Torah must be *entirely* from God, to be authoritative; we cannot suspect *some unspecified parts* of it to have been authored by humans, whether Moses or any other(s), without Divine origin and control.

With regard to the issue of the writing of the Torah, a distinction ought to be drawn between the time of *events* and the time of *narrating* of the events. Reading the stories, one is normally too absorbed to reflect that they were probably not written at the time they occurred. Obviously, there were action situations during which Moses was too busy to write reports; he must have written them later, under some sort of Divine control (preferably - since human memory is always selective). Even where we read that God spoke to Moses to communicate laws (e.g. Lev. 1:1), we may wonder whether Moses was writing that down as it was happening or he wrote it ex post facto.

An attempt at epistemological rationale of Jewish law would run as follows. What is Divinely revealed is indubitably true, because God is omnipotent, omniscient and saintly; and what is tightly inferred from such data by holy and wholly committed men, such as the Jewish Sages, is also without doubt true. Such laws are therefore immutable, not open to doubt or review by later religious authorities or lay thinkers. Let us now briefly consider the strengths and weaknesses of such a rationale.

First, some comments in defense of the concept of ***revelation***. What in principle gives revealed truth its 'apodictic', absolutely certain, character, is that it is proposed to us by a Being, God, who is the Creator of all reality (including objective values, as well as neutral facts), and therefore all-knowing (having created whatever He wished to, consciously, knowing exactly what He was doing and why He did it), and who is perfect in morality (having freely invented it and desired it), and therefore completely honest and trustworthy (wanting to persuade us, not manipulate us). These are, to be sure, not arguments, but concepts included in or implied by the Torah revelation itself, to be taken on faith; however, their significance is their ability to fit into the concept of logical necessity.

As we saw in the opening chapter, a proposition is logically necessary, if it appears as true in all knowledge contexts. There are only two conceivable ways that such modality may occur: either by its having a contradictory which is immediately evidently self-contradictory; or ***by being apprehended as evident within every knowledge context which can ever arise***. The former kind of insight is in the power of all human beings, although their cognitive faculties have natural limits; and it makes possible the firm foundation of secular knowledge (science). The latter kind of insight is obviously not within our grasp, but it would be accessible to an all-encompassing consciousness, such as God's; whence the significance of the omniscience of God to revealed religion. The difficulty in this rationale is that we humans have no prior knowledge of God, except through the revelation, and therefore we cannot logically justify the revelation without circularity, but must always ultimately rely on faith.

As for the second part of the rationale of Jewish *status quo*, namely the implied infallibility of the Talmudic Sages and later religious authorities, the justification given is essentially that, by virtue of their unswerving obedience of the law in practice, these people

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[99] A. Ibn Ezra suggests this specific order may have referred to the Book of the Wars of the Lord, rather than the Book of Torah (Cohen, p. 433).

were favoured by God with special help in their pursuit of truth, help which very few since then have deserved; hence, no review of their conclusions by anyone is ever possible. Reflecting on the miraculous wonder of consciousness as such, and acknowledging the existence of Providence, it is easy to realize that all knowledge is a gift from God. In this perspective, when even the scientific knower is a passive recipient, the idea that some people might be subject to additional grace, and receive special inspiration in their pursuit of religious knowledge, does not seem far-fetched. Nevertheless, here again, there are logical circularities, and we must view the statements made as expressions of faith, rather than pure reasoning. The difficulty is of course that similar claims can be, and indeed historically have been, made by other people, even people in other religions.

> In contrast to religion, natural science is primarily an *inductive* enterprise. That is, it relies heavily on empirical evidence, from which it derives general statements by 'trial and error' methods, like generalization and particularization, and adduction, making imaginative theories and testing them - methods in which the role of deduction, though very important, is still relatively secondary. Faced with a world of appearances, which often conflict with each other and change, the scientist[100] is simply a human being trying his or her best to understand and make sense of things. Not having been made privy to any whispered game plan, even the methodological tools scientists rely on, have had to be evolved inductively, starting from intuitive notions which gradually in an ever larger context have demonstrated their reliability.
>
> In such an approach to knowledge, all appeal to Divine inspiration has been eschewed, and all researchers are therefore on equal footing with respect to the need to provide convincing evidence and arguments for their claims. No one has unshakable authority, however deservedly respected in his or her time for great discoveries and ideas of genius[101]. There is no good old wine, or rather origin and age are beside the point. Newer truths are more reliable than older ones, insofar as they take into consideration not only the data on which preceding beliefs were based, but also more recent discoveries and insights. We are not attached to some perfect past, but on the contrary, full knowledge is projected to be in a distant future, something to which we can only tend but which we can never expect to fully reach.
>
> Since the data base of experience is constantly changing and growing, and new insights and ideas are always conceivable, we must always in principle be ready and willing to review our beliefs and belief-systems, however certain they seem at any given time. This does not imply anarchy or working in a vacuum; there is intellectual and cultural continuity and changes are achieved over time and through collective efforts. Still, every proposition is ultimately no more than a theory, a working hypothesis, valid only so long as it is not overturned by another, more informative and consistent proposition. A scientific world-view might be abandoned in one swoop, if only and as soon as another has been found which is reasonably more convincing and fruitful - and this has occurred often enough.

As we shall see, the above contrast of the methods of religion and science, as respectively deductive and inductive, has some truth and justification; but it emphasizes differences, some of which are superficial, without paying due attention to many similarities.

But, before going further with the issues of method, a few comments are worth making with respect to issues of *content*. A comparison of the specific contents of Torah and Science

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100 The ideal scientist, if you prefer.

101 When we support or reject an idea, only with regard to the person(s) formulating it, without regard to its coherence and cogency, we are committing the logical fallacy of *ad hominem*. (Some reserve the expression for the negative case, preferring *ad verecundiam* for the positive case; but there is no essential difference, in my view.)

is not our subject-matter, here; readers interested in that are referred to specialized literature[102]. Much has been written and continues to be written, comparing the claims of the Jewish religion and those of natural science. Such comparisons usually refer to cosmogony[103], cosmography[104], biology[105] or history[106].

Such comparative studies will, according to the ideology and information of the writer - either seek to contrast religion and science, and reject the one or resist the other; or to reconcile the two, by means of some reinterpretation in more metaphoric terms of certain claims of religion, or by showing the essential compatibility of specific religious claims with current scientific views, or by demonstrating the continuing uncertainties in the scientific positions under scrutiny.

The Torah itself contains various 'factual' information; some of it concerns human history, some is about nature, and some is more metaphysical[107]. With regard to history - for instances, the common origin of all peoples (the Adam and Eve story), their subdivision into linguistic groups (the Tower of Babel story), the time and circumstances of the Exodus from Egypt and entry of the Children of Israel into the Holy Land, and so on. With regard to nature - for instances, the age of the world or data on the physiology of certain animals or the psychology of human beings. With regard to metaphysics - we may mention information like the existence of God, His names, His attributes, powers and acts, like His unity, primacy, supremacy, His justice and mercy, His authorship of the universe and open or hidden providential interference in human affairs, and so forth.

Similarly, for the rest of the Bible, the Talmud and other Rabbinic writings. In the legal debates of the Talmud, the Rabbis often make factual claims, which may be historical or natural as well as metaphysical, to justify their positions. For instance, in *Yom Tov* 2b, Rabbah claims that an egg is always 'fully developed' a day before it is laid; for him this is obvious, because it is required as a logical precondition of the law he defends[108]. In effect, laws handed down by a tradition may be certain enough to infer even plainly physical or biological 'fact' from them[109].

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102 For instances, see Schroeder or Kelemen. See also **Appendix 2** for additional comments.

103 e.g. Comparing the Biblical account of Creation, apparently in 7 days, 5754 years ago, with the Big Bang scenario, 15 billion years ago.

104 e.g. Comparing the seeming Biblical view of the Earth as the main theater of the universal drama, and the empirical evidence that our planet is without centrality in its own solar system, or even galaxy, and a mere speck of dust in an enormous universe. Actually, this issue seems to have been a burning issue at the time of Galileo, but today seems irrelevant, except perhaps to people attached to the qabalistic notions of 'heavenly spheres' built on the Ptolemaic model of the universe (actually several hundred years more ancient than Ptolemaeus, being found in Plato and Aristotle).

105 e.g. What is the nature of life, is it material or spiritual? And what are the origins, ages, and evolutionary courses, if any, of living species?

106 e.g. Comparing the stories and dates given in the Bible and subsequent tradition, with the findings of archaeology and the scenarios they suggest.

107 History is of course an aspect of nature, insofar as we humans belong to this world; however, what philosophically distinguishes historical processes from other natural processes, is the role played in the former by human freewill; methodologically, differences are due to the peculiar intimacy, singularity and temporal distance of most historical facts, which makes most accounts of them largely conjectural, whereas natural facts are generally more easily verifiable. Metaphysics can similarly be analyzed with regard to its distinctions from the natural sciences.

108 Namely, the prohibition to eat an egg laid on a holy day.

109 In the example here given, the concept of full development of an egg is sufficiently vague and ambiguous to be unverifiable. A better example should be found.

> It should be noted in passing that much of the Jewish religion's view of the world, 'natural' and 'supernatural', is built on this mode of thought: i.e. projecting attributes of the world from laws (or even, eventually, just traditions). The latter serve effectively as 'empirical data' from which a world-view is cumulatively developed; they constitute springboards and boundaries for non-legal theories. But such theories must be considered speculative, to the extent that they ignore, or contradict, the data of natural cognition.

Now, in the event of disagreements between religion and science with regard to natural or historical facts, we are of course faced with a problem, which must eventually somehow or other be solved, if we want to have a consistent body of knowledge. It would be dishonest to ignore such discrepancies; but on the other hand, it would be naive to expect to resolve them all convincingly or to make overly severe judgments when they cannot be. We must leave room for doubt and even mystery[110]. With regard to metaphysical facts, like the supreme sovereignty of God, these are to a large extent inaccessible to normal empirical evaluation; we can only speculate concerning them, if we have not been gifted with special states of consciousness or Divine revelation.

In any event, the traditional view is that the Torah, as its name attests, is essentially a legal document. Factual data in it, concerning history or nature, is incidental, providing a context for the understanding of the law. As for information about God, it provides a justification and rationale for the law, suggesting the existence of a "moral order" in the universe. But the essential message is the law. Thus, the content of such a religious document is primarily ***normative***, rather than descriptive. Its role is to prescribe or proscribe, or allow and exempt, or leave to individual choice, specific acts of human behaviour[111]. Within such a perspective, it may matter little what the date of Creation might be, or whether humans evolved from animals, and Biblical passages relating to such matters need not be taken literally[112].

> In contrast, the content of science is overwhelmingly ***descriptive***; it tends to deliberately avoid normative issues. Its goal is to "get at the facts" - to provide humankind with a neutral database, allowing us to make informed choices and providing us with intellectual and material tools to carry them out effectively. Judgments of value are regarded as a separate problem, the concern of ethical philosophy or religion. The ambition of science is only to know the way things "are" (or at least, how they appear to us to be), which includes certain forms of explanation (our answers to "why" things are as they are, are themselves further descriptions, with reference to wider or deeper abstractions or yet more removed causal factors). With regard to the way things "should be", science is modestly silent[113].

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110 In any case, as already indicated, such harmonizations are not within the scope of the present work.

111 Note that Torah laws are regarded by Judaism as binding on their subjects, whereas the concept of "norms" is generally understood more broadly, as including the gentle advice of wisdom.

112 Difficulty arises due to the reasoning that if the Bible is not entirely literal, it cannot be strictly-speaking considered true, and therefore one may doubt its Divine origin. However, it is also conceivable that God wished us to find out certain less relevant or pressing matters for ourselves, over time, by natural means (science) - and considered it enough for us to have, until then, easily-grasped token accounts of things, images and ideas designed to inspire rather than inform.

113 Of course, the normative data which are the main concern of religion are ultimately as "factual" and "descriptive", in enlarged senses of these terms, as the neutral data which interests science. If objective values exist, decreed by the Creator, they are effectively "inscribed in nature", as much as other phenomena. Their ontological status is the same, though they differ constitutionally. However, their epistemological status may be different: whereas neutral information is known through its gradual

> Furthermore, the founders of modern science deliberately chose to bypass metaphysical issues. The idea of God was, as it were, put between parentheses. There were political reasons for this: the Church a few hundred years ago had the power to persecute those with ideas it considered threatening, and often used that power. The interests of the scientists were in any case secular and material; they did not mind leaving religious and spiritual issues to "specialists". But also, they realized that such issues were ultimately unresolvable, and they did not want to get bogged down in them, but preferred to move on and deal with phenomena more accessible to empirical testing and rational scrutiny.
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> Such fractionalizing of the pursuit of knowledge did not necessarily reflect a negative attitude towards religion, but represented a legitimate strategy. The idea of God was not intended to be permanently ignored or rejected, but was merely put on hold. Often the difficult problems we encounter are shunted aside, and we concentrate on the easier ones, hopefully at least temporarily, waiting for new insights and gathering more data in the interim. As the achievements of science increased, ecclesiastics gradually came to accept, even if reluctantly, the narrowing of their domain. In practice, the division of labor has not always been maintained - on either side. Many believers in God and the Bible continue to have dissident opinions concerning nature and history[114], and some scientists occasionally claim their theories or findings have metaphysical or normative implications[115].

From the logical point of view, the setting of norms has always been a problem difficult to solve. There have of course been attempts to derive ethical propositions from emotional, psychological or sociological facts, but invariably close scrutiny reveals the element of arbitrariness involved, the subjectivity and cultural bias underlying the suggested norms. Many people, including many capable philosophers, conclude that objective norms are impossible. The Jewish religion suggests that, in the normative domain, the human faculties of cognition are inadequate because the answers to our questions are not inscribed and made manifest in nature: there has to be an external impulse, a credible message from God, to settle issues and provide us with standards. God, it seems, wished to reserve access to this domain, and transmit moral guidance to us through the words of Torah.

2. *Davqa* or *Lav-davqa*?

In this section, we shall demonstrate, through a technical peculiarity of Talmudic logic, that in contrast to other kinds of discourse, it is inherently oriented towards deduction. However, we shall also begin to unveil, with reference to the exceptions to this very same peculiarity, the strong inductive currents underlying Talmudic thought processes.

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appearance before our perceptual senses and conceptual insight, Judaism suggests that God chose to deliver normative information to us (mostly, if not exclusively) by special proclamation.

114 Belief or disbelief in God should have no effect on the descriptive appearance of the natural world, since one can always claim that, however the world happens to appear, it may well have been the way He chose to make it. Conflicts between religion and science arise only in relation to religious texts or oral traditions; and even then, the flexibility and intelligence of the beholder count for much.

115 For examples, speculations about Creation by Big-Bang proponents, or advice given by psychologists to their clients. But we must not forget that scientists are people, too; and like all people, need answers to certain questions right now, to be able to run their lives. People may, even without religion, have opinions about what is right or wrong, and correct or incorrect ideas as to how to justify these opinions. Often, secular moral beliefs historically stem from religion, but after being deeply ingrained in a person or culture they become independent of the religion.

When one compares the logical pronouncements in Talmudic and other Rabbinic discourse to the logic apparent in common and scientific thought and discussion, an immediately noticeable practical distinction is ***the different interpretation each gives to particular propositions***. This refers to sentences which are introduced by the quantifier "some", as in "some swans are white".

Normally, **in everyday discourse or in science**, we understand the expression "some" as meaning "at least some" - it is *indefinite* about the exact quantity. Such a statement is *left open, to give us time for further investigation*, which will determine whether we may assume, for the subject-matter at hand, that the universal "all" is applicable or we must assert that the contingent "only some" (meaning "some, but not all", or "some yes and some no") is the case. These latter quantities are *relatively more definite* (with regard to proportion, though not to number). In contrast, **in Talmudic and related discussions**, the word "some" has usually got a *prima facie* value of "only some", which excludes the option "all". It is only after much debate that *sometimes, in rare cases*, the initial "some" is concluded to have been intended as an indefinite particular, which admits of interpretation as "all".

Particular statements taken to be contingent are said to be ***davqa*** particular; whereas indefinite particulars, which allow for a universal as well as contingent interpretation, are said to be ***lav davqa***. *Davqa* is Aramaic[116], and means 'thusly', or 'precisely thus', or 'exclusively thus'; *lav* signifies 'not'. These expressions are not, of course, limited to the quantifier "some", but may be applied to any quantity variously interpretable; for instance, does "10" mean exactly ten, or ten or more, or up to ten, or about ten?

Now, this difference in approach has a deep and interesting reason; it is not accidental or merely conventional. When, say, an Amora (a Rabbi in the Gemara) encounters a particular statement by a Tana (a Mishnaic Rabbi), or in the Torah itself, it is a matter of course for him to interpret it, at least to begin with, as intended as *davqa* "some", that is, "some, but not all". *For it is a statement made by an intelligent being* (a Tana, in the case of the Mishnah, or God, in the case of the Torah). So he (the Amora) can argue: "*Nu?* if the author meant 'all', he would have said so!" Thus, the statement may reasonably be assumed to mean no more than what it says - that is, only "some", or "only some".

In Talmudic logic, then, "some X are Y" (**I**) is taken to *imply and be implied by* "some X are not Y" (**O**), because both mean no less than **IO**; i.e. there is here no **I** or **O** other than in **IO**. This ***deductive*** rule[117] holds in the large majority of cases, as the ***lekhatechila*** (initial) position. It does happen comparatively infrequently that, after a thorough analysis of the situation, such an *ab initio* assumption is found untenable, because it leads to internal contradictions or acute disagreements between different Rabbis. In such case, the particular, which was first taken as *davqa*, is ***bedi'eved*** (as a last resort) downgraded to a *lav davqa* status (making it compatible with a corresponding general proposition, in which case **I** and **O** are subcontrary). Here, the indefinite particular is the result of an ***inductive*** process, an attempt to reconcile conflicting theses, to resolve a difficulty. However, it does not retain this status long, since the whole purpose of the process is to arrive at the corresponding general conclusion![118]

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116 Related to the Hebrew 2-letter root *DQ*, connoting minuteness, as in *daq*, fine dust (Isaiah, 40:15), *daqah*, a minute in time, and *bediuq*, exactly.

117 This form of inference, which is quite common in Talmudic discourse, might be called, in English, "inference by negation"; in Latin, its name is, if I am not mistaken, *a-contrario*.

118 We must interpret in a similar vein statements like the following, by Guggenheimer (pp. 179, 193):

The above explains why Talmudic logic is regarded as essentially deductive. The Talmud is built on a number of *ready-made* (written or oral) propositions considered to be of Divine origin. In such a situation, a proposition of the indefinite form **I** or **O** is merely a shorthand expression of the definite compound **IO**, because that is the expected inductive result in, say (this is a wild guess), 95% of the cases to be dealt with. The raw data on which such knowledge is based is already verbalized; the epistemological processes used are directed towards the ***interpretation*** of this verbal raw data (expressing it in other words, drawing inferences from it), through its internal and external ***integration*** (that is, checking the mutual consistencies of the parts of the revelation, and its coherence with the wider context of empirico-rational knowledge, including linguistic factors).

> In contrast, in ordinary or scientific thought, there are no *verbal* givens, other than those impinging on individuals from the rest of society[119]. Verbal knowledge is ultimately built-up from experience, by labeling groups of similar and distinct phenomena (be they sensory or mental, concrete or abstract). In such a framework, there are virtually no absolutes which can serve as top principles from which the rest of knowledge may be derived; apart from a very small number of logically self-evident axioms (whose denials would be paradoxical, that is, self-contradictory), we have to develop knowledge very tentatively and gradually. Here, the indefinite particular forms **I** and **O** are pressingly needed for efficient discourse, as way-stations and stepping-stones to fuller knowledge, as already explained.

Nonetheless, our above observation does not signify that there is an unbridgeable epistemological gap between the two "logics", that of the Talmud and the common. It should be clear from the preceding that the two systems use by and large one and the same logic[120], only *their givens differ in format*. That is, were they faced with equally formatted data, their way of development would indeed be identical; but one depends largely on verbal givens,

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> The inner logic of the Law (...) is definitely hostile to modalities... The Talmud avoids all attempts at modal logic. Instead, we have a set of rules, known as **rob** (majority) and **hazaka** (status quo ante) which serve to transform actual probabilities into judicial certainties. The result of such transformation may be used in a universe of discourse in which modalities have no place.

While it is true that *lav davqa* statements in the Talmud are left indefinite no longer than it takes to find a *davqa* finale to their discussion, it is totally untrue to claim that there is no modality in the Talmud. The very fact that distinction is made between *lekhatechila* and *bedieved* positions is proof enough that logical modalities are involved in it. The recognition that some arguments are strong (deductive), and some relatively weak (inductive), is further proof. But anyway, the "transformations" mentioned in the above quotation would suffice: before a ruling is decided, it must have been momentarily uncertain, or else it would not have been open to debate. As for natural, temporal, extensional and especially ethical modalities - the Talmud would have been unable to describe different situations and conditions without use of them, nor been able to make any legal rulings. We might readily have excused Guggenheimer with reference to the widespread gap in knowledge concerning modal logic, which he himself admits, saying: "modal logic is without satisfactory formulation even today"; but his denial of modality is too extreme even in that context.

119 We must refer, here, to humanity as a whole since its inception, when discussing the construction of language and knowledge from scratch; evidently, individuals today receive a great deal of their knowledge in already verbalized form from the society around them.

120 This statement, and similar ones elsewhere in the present chapter, will have to be considerably revised later on in the book, after formal analysis of the Rabbinic hermeneutics. For we will thereafter discover Talmudic thought processes which can only be called 'logical' or 'inductive' by a very generous concession - but which rather deserve the labels 'pseudo-logical' and 'arbitrary'.

while the other is limited to non-verbal data. It is true that *their givens also differ in source*, being Divinely revealed (to some people) in one case and naturally apparent (to everyone) in the other; but this issue affects the credibility of the initial data, rather than the subsequent mental processes relating to assimilation of the information.

In any case, note, the two bodies of knowledge are not mutually exclusive. For a start, religious knowledge is never totally independent of secular data; a religion may explain the material world away, as a big illusion, but it may not completely ignore it - the language used by religion is understood only because it is reducible to common experience. And since religion (certainly, the Jewish religion) admits of secular data, it also acknowledges the inductive method which assimilates such data. But furthermore, as we shall see, the method by which religion (at least, the Jewish) ultimately assimilates its own peculiar data is very similar to the secular.

> Secular knowledge without religious data might seem conceivable, but only if one turned a blind eye to various otherwise burning questions - in the limit, religion is unavoidable, except by silence, because even negative answers to such questions may be counted as effectively 'religious' in their own way[121]. With regard to methodology, the secular sciences certainly, to some degree, use techniques found in religious study, like textual analysis, since the sciences generate texts to communicate their results, and these texts while being written or read are subject to analysis. Textual analysis is also used in secular contexts in relation to historical documents (literary or legal documents, including the Bible itself). So scientists cannot object to hermeneutics as such (though they may look askance at specific interpretative techniques).

We have seen that Talmudic logic, being more deductive than inductive, has a preference for the *davqa* interpretation of particular propositions. However, we will now show that *formal logic cannot ultimately avoid recourse to lav-davqa particulars, and so demonstrate that Talmudic logic must at least implicitly acknowledge them.* The situations implied by the forms **I** and **O**, of partial ignorance or deficient knowledge, arise again and again in the course of all human thought - not only within inductive processes of gathering and judging empirical data, but just as much *within purely deductive processes*. Indefinite particulars are therefore indispensable if we want to be articulate.

We could, in truth, construct a formal logic with a propositional arsenal devoid of indefinite particulars, simply by explicitly expressing our position in such cases by the disjunction of definite forms (general and contingent). Instead of **I**, we would always say "either **A** or **IO**"; and instead of **O**, "either **E** or **IO**". But this would be artificial. Why deprive our thinking of valuable tools, and not take as given what ordinary language has provided? Ordinary language surely satisfies the needs of our cognitive faculties. A certain degree of linguistic brevity is necessary to reason clearly, otherwise language may become a source of confusion. The forms **I** and **O** make such simplification possible (even though having them slightly increases the size of our propositional arsenal).

To show that Talmudists need indefinite particulars as much as anyone, to reason clearly beyond the *ab initio* stage, we need not go into a systematic and exhaustive listing and analysis of logical processes. It suffices for us to consider some *arguments whose conclusions*

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121 In this sense, atheism is also a religion, one which opts for a negative answer to the question of God's existence.

are quantitatively more indefinite than their premises. In eduction, we may illustrate what we mean with reference to certain conversions:

(**A)** All X are Y, is convertible to (**I**) Some Y are X.

(**IO**) Some X are Y and some X are not Y, converts to (**I**) Some Y are X.

Whether we start off with a general affirmative or contingent proposition, we can by conversion only arrive at an indefinite particular; so that in fact it is only the **I** element in these forms which is convertible[122]. In contrast, on the negative side, an **O** proposition is inconvertible, and only the **E** form may be converted (but that fully, to an **E**)[123]. Thus, given **A,** or given **IO**, inference by conversion will only yield a conclusion of less definite quantity, namely an **I**. We could, of course, reword the conclusion as "either all Y are X, or some Y are X and some Y are not X", but its correctness might seem less immediately evident. Other eductions display similar results, though in different cases[124].

With regard to syllogistic reasoning, particular conclusions are almost always indefinite. Only in the third figure (by conjoining the valid moods **3/IAI** and **3/OAO**, which have the same minor premise) is it possible to construct an argument with a contingent (major) premise, which yields a contingent, and therefore just as definite, conclusion. We get the following "double syllogism":

Some Y are Z and some Y are not Z (**IO**);

and all Y are X (**A**);

therefore, some X are Z and some X are not Z (**IO**).

In all other cases, even if we start with a contingent proposition as one of our premises, the conclusion as such can only be an indefinite particular. For in the first and third figures, the valid moods **AII** and **EIO** cannot be combined, since their major premises are contrary, and there are no valid moods with a negative minor premise; and in the second figure, only negative conclusions may be drawn (see **AOO** and **EIO**), anyway. This shows that anyone reasoning syllogistically from contingent premises *is sooner or later bound to encounter indefinite particular conclusions*.

Thus, deductive logic requires a language with *lav davqa* particulars, as surely as inductive logic does. This incidentally confirms that Aristotelian-type logic is indeed generic, as applicable to the world-view of the Talmud (with its preponderance of deduction), as to that of people concerned with cognition of non-revelational phenomena (who rely more on induction).

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122 "Some X are Y" and "Some Y are X" both mean "some things are both X and Y", in which form the order of the terms is irrelevant.

123 The conversion of **E** is reducible to that of **I**, by ad absurdum; or it may be understood independently, in a like manner.

124 For instance, in contraposition, it is the **E** and **I** forms which inhibit the process, since "All X are Y" (**A**) may be contraposed to "All nonY are nonX", and "Some X are not Y" (**O**) to "Some nonY are not nonX".

The reading of (indefinite) *particular* propositions as contingent is the paradigm of *davqa* interpretation; a similar movement of thought is used in relation to *general* propositions, as we shall now explain. When we read a particular proposition 'Some X are Y' as *davqa*, we are producing new information, because we are supposing that 'Some (other) X are not Y'. The latter proposition concerns instances of X *other than* those subsumed by the former; and it assigns the *opposite* predicate to them (i.e. not Y, instead of Y).

> For this reason, the allegedly derived proposition is sometimes, in Latin, said to be the ***a-contrario*** of the original. I hesitate to use this expression too freely, however, because it might be misinterpreted. It is important to note that the original proposition and the one derived from it by a *davqa* reading are not contrary; they are compatible, since they can be and are conjoined. Thus, *a-contrario* does not mean 'on the contrary,' but assigns, to the remainder of a subject-class, the negation of a predicate.[125]

Thus, the essence of *davqa* interpretation is to *limit* a statement, by means of an *exclusion*. In the case of particulars, the movement of thought is from 'Some X are Y' to 'Only some X are Y' (or, needless to say, from 'Some X are not Y' to 'Only some X are not Y'). Similarly, in the case of generals, the *davqa* reading of 'All X are Y' is the exclusive 'Only X's are Y', implying 'Every nonX is not Y' - that is, 'No nonX is Y'[126] (or, likewise, the *davqa* reading of 'No X is Y' is 'All nonX are Y').

Note well that, by mere *eduction*, we can only infer from 'All X are Y' that 'Some nonX are nonY' (the process is called inversion, and is validated in this instance by contraposition, then conversion[127]); to get to the inference 'All nonX are nonY', we must *generalize* the inverse. From the point of view of ordinary logic, therefore, the *davqa* reading of a general proposition involves an inductive factor. Just as in the case of particulars, new information is produced, so in the case of generals.[128]

The parallelism of the *davqa* interpretations of general and particular propositions can be further brought out as follows. Consider a subject S (for species), which is subsumed under a larger subject G (for genus); and let P refer to a predicate. The general 'All S are P' implies the particular 'Some G (namely those S) are P', and the former's *davqa* implication 'All nonS are nonP' parallels the latter's 'Some G (namely those not S) are not P'.

Similar readings may be made with respect to (normal) conditional propositions. For instance, when 'if P, then Q' is understood as *davqa*, it implies 'if not P, then not Q'; although *lav davqa*, it only (normally) implies 'if not P, not-then Q'.

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125 Note, anyway, that *a-contrario* is not really an 'argument' (though used in arguments); it is merely a 'reading', since the result is not formally inferable from the given.

126 This is usually the case, though note that *'davqa all* X are Y' is often intended to mean: *literally all* (and not just most) X are Y. What is negated, in such case, is the possible assumption that the quantifier 'all' is being used in a hyperbolic sense, i.e. when what is really meant by it is '*virtually all*' or 'almost all (but not quite all)'.

127 Inversion of "No X is Y" would be done by conversion, then contraposition.

128 Note that modality changes may be involved. For instance, the Rabbinical reading of Lev. 7:19, which says that the ritually impure are *allowed* to eat holy offerings, is that the ritually impure are *forbidden* to eat holy offerings (see Scherman, p. 51).

3. *Kushya* and *Terutz*.

In comparing the methodologies of the Talmud (and cognate investigations) and science (and everyday discourse), so far, we have stressed certain overall differences. We noted, firstly, their different data bases. And, secondly, we presented religion as a predominantly deductive system, and secular science as an essentially inductive one, and indicated some of the reasons for this contrast. But we need now to consider certain similarities between these disciplines, to obtain a more balanced appraisal, for further scrutiny makes clear that they converge in many respects.

With regard to raw data, though in theory our religion is based on mystical experiences (mainly the Revelation at Sinai, which was partly collective, though in large measure the privilege of prophets, especially Moses, to which we must add later events, like the prophecies of Isaiah, for instance), which included both non-verbal and verbal components - in practice, today, only the verbal components remain, so that our religion depends on very ordinary sense-data, namely *words read in books or heard from the mouth of others*, as well as some personal intuitions, and some imaginations and emotions.

With regard to logic, though the starting posture of Jewish law is theoretically deductive, if we pay close attention to the way such law is actually *developed* in Talmudic and Rabbinic texts, and the way it is *taught and studied* in practice, we see that they are *manifestly inductive*. The Talmud develops in large part **dialectically**, by uncovering a ***kushya*** (literally, a difficulty - a logical problem) in the midst of received texts and related data, and searching for and usually finding a ***terutz*** (a solution) for it. This is also the way the Talmud is taught and studied, retracing the steps of the original debate.

The *kushya* in question may be an outright contradiction, or it may be a less obvious tension between two or more statements. Two or more propositions may be said to be in a state of *tension* - of possible incompatibility - if there are conceivable logical or natural qualifications under which they would be contradictory, or there are conceivable interpretations of their terms which would result in an untenable antinomy. Also, the difficulty may not be a conflict between explicit statements, but relate to implicit factors, such as a perplexing silence concerning some topic or a surprisingly superfluous comment. However, once the tacit source of discomfort is brought out in the open, the difficulty is verbalized and can be dealt with.[129]

Conflicting propositions may come from the same or different sources. The relevant sources are, as we have seen, the written Torah, the Nakh, the Mishnah and allied documents (e.g. Baraitot), the Jerusalem and Babylonian Gemarot and allied documents (e.g. later Midrashim), oral traditions carried by authoritative Rabbis, and later various Rabbinical Responsa and codes of law[130]. Thus, for examples, a Mishnah may seem to conflict with some

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[129] The word *kushya* has originally, within the Talmud, a more specialized sense, referring especially to textual differences. However, nowadays, in Talmud-study, the word is used more broadly, much like the English word 'difficulty'. It is in this sense that we will use it here. Note that there is often a subjective element involved: it is *someone* who is perplexed by silence or surprised by repetition, etc. In such case, there is a need to understand the whys and wherefores of that person's logical or other expectations, which other people may not share.

[130] *Responsa* are written answers to questions posed to authoritative Rabbis concerning the Halakhah; this way of clarifying and explaining the law has played an important role in Jewish life since

Torah sentence; or two Gemarot, even two having the same author, may seemingly conflict; and so forth (in every combination). In rare cases, the difficulty may be an apparent conflict between the teaching of some Rabbi and some teaching of science (e.g. agronomy or medicine).

The role of the *terutz* is to reconcile such real or imagined differences. This might be achieved in a variety of ways. Sometimes, the Rabbis admit not knowing how to solve a problem, and they leave the issue open (***teku***) "for the prophet Elijah" to deal with when he returns. Meanwhile, they may use their prerogative to arbitrate, and simply reject, through a majority vote[131], one of the conflicting theses, which is thus reclassified as "a theoretical tradition without practical appeal"[132]. But ***preferably, the conflict is dissolved by showing that the propositions involved concern distinct assumptions, or refer to different cases, or are applicable to different circumstances or times, or mean different things***. At first sight, the conflict seems insurmountable, but after careful verbal or conceptual analysis the propositions are shown to be more harmonious than previously thought.

> Such resolutions of paradox are often, after a long-winded debate, disappointingly anti-climactic: a statement which seemed at first general, turns out to have been of more limited applicability; or a statement initially made unconditionally, is finally inferred to have been intended as conditional; or some word(s) that were apparently identical end up having dissonant senses in different contexts. One wonders why the people involved did not from the start take the trouble to express themselves clearly and unequivocally, if what they meant was the same as what they are later taken to have meant. In some cases, one is tempted to suspect an *ex post facto* forcing of reconciliation! To a newcomer, or an unsympathetic outsider, the process may at times seem downright dishonest, a come-on, a time-wasting weaving and unweaving of illusions[133]. But evidently, or apparently, there is progress, since a reasonably consistent and meaningful doctrine does gradually emerge. From a didactic point of view, the succession of confusion and relief serves to create and maintain interest. In any case, what concerns us here is the inductive role of the dialectic.

An underlying problem is the telegraphic style used in Talmudic discourse. A seemingly simple word is often a mere *catchword* for a very complex thesis, and there is no way for us to know what's what except *through* the dialectic. ***Theses and counter-theses are not from the start clearly defined, but receive their final form only through the final synthesis***, which shows that they were not quite so antithetical as they appeared.

Geonic times. The codes, like Maimonides' *Mishneh Torah* and R. Joseph Caro's *Shulchan Arukh*, were later developments, but are today of course very authoritative in any legal decision making.

131 Regarding the all-important principle that the majority opinion is Halakhah, its epistemological justification obviously cannot be that the truth comes to be known through a majority vote. Rather, we may refer to a shared impression of truth, or a collective memory of a previously known, but no longer certain, truth, in which cases majority vote establishes a sort of inductive probability. A still better rationale to offer is ontological: through a power granted by Divine authority, a potential law is made actual by majority arbitration.

132 The epistemological motive of that concept is obvious enough: namely, to incapacitate the rejected thesis Halakhically, without delegitimizing the authority of its proponent, i.e. without putting in doubt his infallibility in other contexts. Ontologically, the concept seems to imply a transcendental reservoir of previously potential laws which can no longer be actualized. That idea would be consistent with the remark made previously, that the legislative power seemingly granted to the Rabbis by God must be viewed as a creative power, since the moment a law is promulgated by them it becomes an objective value, a normative fact. We may then speak of the irreversible actualization of a potential law.

133 It must be pointed out that this kind of reasoning, in which the goal is to reconcile conflicting authorities, is not confined to Judaism, but was common practice in Medieval European universities.

Examples abound. For instance, in *Baba Qama* 84b, which debates the payment of damages in the event of burning (causing pain) or bruising (wounding) - for one party, the term "burning" is interpreted as *ex*cluding "bruising" by definition, and the term "bruising" is taken as *in*cluding "burning"; for another party, the term "burning" is interpreted as "burning *and* bruising" by definition, and the term "bruising" (funnily enough, if I am not mistaken) is taken to mean "burning *without* bruising"; and so on. We see here that "X" need not mean "X, whether or not Y", but may mean "X and Y", or "X but not Y", or even "notX and Y", or "notX and notY". A term is merely an abridged title (***techila***) for a more complicated expression, in which it may even have negative value!

Now, the dialectical process of correlating divergent answers to a legal question cannot be considered part of deductive logic, but has to be classified as inductive, for several related reasons. Firstly, the process of finding answers to the questions posed is more creative than mechanical; it is essentially a process of *adduction* - proposing new terms or conditions, which will reestablish internal or external consistency in one's knowledge base. Secondly, alternative solutions may usually be offered to the problem at hand, and often are. Thirdly, the final decision, if any, is rarely arrived at immediately, but rather through a gradual trial and error process. The Sages make various suggestions as to how the conflicting theses *might conceivably* be harmonized, and these proposals are be successively eliminated for some reason or another, until a proposal is found which is obviously acceptable to everyone or withstands all criticism leveled against it.[134]

Notice that we have two superimposed levels of discussion: at the core, there is a conflict relating to textual matters and/or authoritative opinions about such matters; but next, there may be contending opinions as to how the core conflict may be remedied. Yet further levels of discussion may be identified, when we consider all subsequent commentaries and supercommentaries across the centuries! All that is additional evidence of the inductive character of large segments of Talmudic discourse.

Similarly, by the way, the mental operations of anyone who teaches or studies the Talmud are of necessity inductive. All the more so, since the Talmud does not set out its results in an orderly, organized fashion, but leaves its researches in their brute form. The reader is required to retrace the course of the discussion, as if a participant in it, using trial and error. For this reason, the Talmud remains forever a peculiarly living document, free of the dry finality of more modern codifications of law.

The radicalness and importance of our classification of much of Talmudic logic under the heading of *inductive* logic must be emphasized, for it is contrary to the views of certain past commentators who (it must be said, without intending disrespect) did not always have a very advanced knowledge and understanding of the science of Logic.

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[134] See Lewittes pp. 66-68 on Rabbinic disputation; in particular, note R. Yannai's statement: "If the Torah had been given clear-cut, no opinions would be countenanced in the halls of learning." On the wide law-making powers of the Sanhedrin in practice, see pp. 62-63 of same.

4. Standards of Knowledge.

Thus, in conclusion (so far in our research), the thought-processes involved in and generated by the Talmud largely resemble those of science. Like the scientist, the Talmudist must repeatedly make hypotheses and test them on the given data which specifically concerns him, as well as pursue logical consistency.

For the scientist, the data-base consists ultimately of non-verbal sensory impressions of natural phenomena (which are ideally reproducible in public, though not always so). For the Talmudist, as we saw, the data-base consists of the (written or oral) verbal leftovers of long past mystical experiences. But apart from these essential differences in empirical context, the two display *a uniform mental response, the same array of methodological tools - inductive and deductive arguments used in various combinations and orders*. Which is to be expected - we are all people, similarly constituted, having the same cognitive faculties, subject to the same epistemic facilities and constraints.

Epistemology is the philosophical discipline concerned with understanding how knowledge is obtained and how it may be justified. That discipline, through the work of formal logicians, has made clear that the justification of any content of knowledge, or of any change from one content to another, is *a formal issue*. Prior to any scientific or Talmudic inference, be it inductive or deductive, there is ***the need to examine the logical validity of that method of inference independently of its content***. No reasoning process, be it by a pious Talmudist, a professional scientist, or a common man or woman, is exempt from such formal scrutiny.

However, it must be emphasized that (contrary to the views of certain philosophers and logicians) the validation of a logic is a very prosaic achievement of "common sense", and not at all the special privilege of some transcendental method. Just as our everyday reasoning proceeds by logical intuitions - our common conceptual insights that, say, some thesis is compatible or incompatible with another, or implies or does not imply it - so it is with the reasoning processes of logicians intent on formal validations. The ultimate test of any reasoning process, material or formal, is its ability to convince us. If, sincerely, however informed and intelligent we be and however hard we try, we are not convinced - then, we are not convinced. An argument must carry within itself the power to change our minds.

Some logicians think that we can, following the model of Euclidean geometry, in advance posit standards of reasoning, by means of "axioms" standing outside of the totality of knowledge. But they fail to realize that such "axioms" would themselves remain unproved, and therefore be unable to prove anything. Other logicians, finding this circularity problematic, try to avoid it by rejecting all conceptual knowledge and considering only purely perceptual knowledge as valid. However, such a position cannot be consistently sustained, being itself a conceptual proposal. A balanced and practical viewpoint is only possible, through honest introspection and acknowledgement of the ways we actually reason, and reason about reasoning.

Talmudic reasoning, like secular reasoning, could not proceed if we did not have the same logical reactions to the stimuli of received doctrines. An esoteric "logic", like the incomprehensible mental acrobatics of the Zen *koan*, has little credibility. It is only to the extent that a "logic" causes a universal reaction of understanding and conviction that it

qualifies as a real logic. The goal of the *koan* is not to convince by appeal to evidence and rational processes, but to assist those who meditate on it to overcome such ordinary mental patterns and break through to another kind of consciousness; in that case, assuming even that it works and produces the desired result, the *koan* is not a logic, but at best a psychological tool.

Similarly, we must draw a clear line between Talmudic logic and faith; these bases of belief cannot be confused. When we face an argument, or a form of argument, used in the Talmud, if we are to grant it *the status of logic*, it must be capable of convincing us by itself, *independently of* any issue of faith. We may well grant proper respect to faith, but we cannot do violence to our minds and pretend that there is logic where there is none. Being convinced by an argument cannot be *a test of faith*; either we arrive at a conviction through logic, in which case no forcing of belief is needed or permissible, or through faith, in which case we simply honestly admit that this is the basis of our belief.[135]

These comments have to be made, here, because it may be that the Talmud has a *koan*-like function. Many positions and processes found in it may seem weird to some people; perhaps continued study eventually causes a sort of shift in consciousness, after which everything previously found enigmatic becomes perfectly comprehensible. Be that as it may, we cannot be swayed by such a consideration; our concern in the present volume is only with logic. We will as we proceed consider various patterns of argument found in the Talmud, and related documents, and try to fairly and frankly assess their credibility, with reference to high standards of truth.

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135 What is said here should be obvious, but I have often enough observed people afraid to admit being unconvinced by an argument, through fear of being suspected of lack of faith or of disrespect of the Rabbis.

9. TRADITIONAL TEACHINGS.

A brief overview of the ways Judaism traditionally presents the art of "Talmud Torah", followed by some suggestions on same.

1. Hermeneutics.

Talmudic law was decided, with reference to the Torah, after much debate. In a first stage, the debate crystallized as the Mishnah; in a later stage, as the Gemara. The methods used in such discourse to interpret the Torah document are known as 'hermeneutic' principles (or, insofar as they are prescribed, rules). In Hebrew, they are called ***midot*** (sing. *midah*), meaning, literally, 'measures' or 'virtues'. This Talmudic 'logic', as we shall see, has certain specificities, both in comparison to generic logic and intramurally in the way of distinct tendencies in diverse schools of thought. Various Rabbis proposed diverse collections of such methodological guidelines, intending thereby to explain and justify legal decision-making[136].

> Readers may find it useful, in this context, to study: the articles on hermeneutics in the *Jewish Encyclopedia*[137] and the *Encyclopaedia Judaica*[138], as well as Bergman's *Gateway to the Talmud*[139], and the *Reference Guide* to Steinsalz's English edition of the Talmud.

The earliest compilations were: the **Seven Rules of Hillel haZaken** (1st century BCE)[140]; the **Thirteen Rules of Rabbi Ishmael ben Elisha** (2nd century CE); and the **Thirty-two Rules of Rabbi Eliezer ben Yose haGelili**, of slightly later date. These lists are given as Baraitot, the first two in the introductory chapter to the *Sifra* (1:7)[141] and the third within later works. As already mentioned, Baraitot were legal rulings by Tanaim not included in the Mishnah; but they were regarded in the Gemara as of almost equal authority[142].

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136 The hermeneutic principles are applicable more broadly to all Scriptural exegesis, including Hagadah; however, in the case of the non-legal aspects some less strictly regulated forms of interpretation are often used, additionally. If the latter are not considered trustworthy enough for Halakhah, I do not see how they may be relied on for Hagadah, which also affects the beliefs and actions of people.

137 Vol. , pp. 30-33.

138 Vol. 8, pp. 366-372.

139 Ch. 13.

140 Note that Hillel and Shammai are traditionally not given the title Rabbi, or any equivalent.

141 A Halakhic commentary to *Leviticus*, also known as *Torat Kohanim*, attributed to R. Yehudah b. Ilayi, a disciple of R. Akiba (2nd cent. CE).

142 As Scherman has pointed out, these Baraitot were different, in that they were not in themselves statements of law but explanations of how the laws were derived from the Torah source.

According to Jewish tradition, at least since Geonic times (notably, Saadia Gaon) and still today, these rules all date from the Sinai revelation and were since then transmitted from teachers to pupils without interruption[143]. This is *in part* confirmed by statements in the Talmud and literature of that era, in which Rabbis claim to have received knowledge of certain rules from their teachers[144]. But the historicity of the *general* claim has not so far been demonstrated by any pre-Talmudic evidence: in particular, there is no obvious mention of such interpretative principles anywhere in the Tanakh.

> According to *Jew. Enc.*: "The antiquity of the rules can be determined only by the dates of the authorities who quote them; in general, they cannot be safely declared older than the tanna to whom they are first ascribed. It is certain, however, that the seven middot of Hillel and the thirteen of Ishmael are earlier than the time of Hillel himself, who was the first to transmit them. At all events, he did not invent them, but merely collected them as current in his day, though he possibly amplified them." Still according to *J.E.*, Ishmael's rules are "merely an amplification of" Hillel's; and similarly Eliezer's rules coincide in many instances with Hillel's and Ishmael's, though in other instances they concern the Hagadah rather than the Halakhah.

It does not, in any case, seem likely that such rules would suddenly be 'invented', as a conscious act, by their apparent authors or anyone else. The most likely scenario, from a secular point of view, is that they were for some time unconscious discursive practices by participants in legal debates; gradually, it occurred to some of these participants (most probably precisely those whose names have come down to us as formulators, or reporters and collectors, of hermeneutic rules) that they and their colleagues, and their predecessors, repeatedly appealed to this or that form of reasoning or argument, and such implicit premises would be made explicit (thereby reinforcing their utilization). Different such commentators would find some rules more convincing than others and thus compile selections; eventually, contending schools emerged.

> Those would be the natural stages of development of such a body of knowledge: first, unconscious *practice* (which might be correct or incorrect); second, dawning *awareness* of such practice (due to what we call 'self-consciousness'); thirdly, *verbalization*, randomly to begin with (by exceptional individuals, focusing on the most outstanding practices), and then more and more widespread (more insights, by more people, as a cultural habit develops); fourthly, systematization (of the simplest kind, namely: listing) and dispute (as different lists are drawn up by different groups). In the case of Judaism, the next stage was *merging* results (by later generations, out of veneration making all the lists 'kosher' at once); and subsequently, there was a stage of *commentary* (trying to justify, explain - within certain parameters). However, sadly, as we shall see, the last natural stages of *formalization* and *evaluation* never occurred (until recently, outside orthodox circles).

According to *Jew. Enc.*, these various lists were not, even in their own times, viewed as exhaustive. I am not sure how true that remark is, i.e. whether there is any statement in the Talmud or related literature which confirms the assumption that Hillel, R. Ishmael, R. Eliezer, or whoever compiled a list, did not consider himself as having succeeded in making a full

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143 To explain the differences in listing, orthodox commentators go to great lengths. We shall have occasion to discuss some of these explanations as we proceed.

144 For examples, *klal uphrat*, a R. Ishmael principle, is attributed to Nechunia b. Hakaneh (*Tosefta Shevuot* 1:7); *ribui umiut*, a R. Akiba principle, is attributed to Nachum Ish Gimzu (*Shevuot* 26a).

enumeration of valid *midot*. At the other extreme, the view of traditionalists today, that these lists were all equally complete, is (as we shall see) just as conjectural, and based on anachronistic and circular arguments.

What is in any event evident, is that the rules in each list were not in their own times uncontested. The school of Hillel was opposed by that of **Shammai**, and Rabbi Ishmael's formulations were challenged by **Rabbi Akiba ben Yossef**. It is interesting to note that, *at first, these opposing views were considered mutually exclusive; but, over time, they came to be used indiscriminately*[145].

It apparently came to be considered that, although two dissonant rules may indeed lead to conflicting interpretations, the selection of one or the other of them as the finally applicable rule in any given single context, was a matter of tradition or majority decision; effectively, the correct conclusion was predetermined, and the rule selected only served as an ex-post-facto rationalization. Thus, the ontological status ascribed to the hermeneutic rules is that they were conditional on material factors - formalities activated or left dormant by textual content (which details were, one by one, designated by authorities, on the basis of transmissions or by vote).

Although R. Akiba's approach usually prevailed in practice, R. Ishmael's thirteen *midot* are the most popularly known: they have become part of the daily liturgy and can be found in most Jewish prayer books. Since the above mentioned initial formulations, many attempts have been made to compile more complete lists (for instance, by Malbim). We will in the next chapters analyze all the hermeneutic principles systematically with examples; here, we will be content to only make some introductory comments.

At the outset, it shall be pointed out that **the rules are *not* all of a purely deductive nature**, contrary to what may be thought at first glance. When the rules suggest a "derivation", they do not necessarily refer to a mechanical relation between premises and conclusion. Most of the rules' results are partly or entirely inductive; that is, they are, at best, a good working hypothesis within the given context of knowledge, which may possibly be replaced by another hypothesis or a deductive inference in an altered context of knowledge.

Some of the rules, wholly or partly, represent deductive or inductive principles which can readily be justified by natural logic. Of these, some may be validated in formal terms (i.e. substituting symbols for specific contents); whereas others describe discursive acts which are rather intuitive - responses to material data without fixed patterns - and which can be approved with reference to broader epistemological considerations. However, some of the rules, wholly or partly, seem, from the point of view of natural logic, rather obscure and arbitrary, and remain acceptable only due to a claim that they are of Divine origin.

> The Talmud itself at least implicitly recognizes the inductive nature of many of the arguments in it. This is evidenced by the fact that when several alternative premises are given for a certain conclusion, it is viewed as being weak. The Rabbis argue: *Nu*, if each of the sets of reasons given was sufficient, why bother to adduce the others? From a deductive point of view, there is indeed no utility in giving many reasons; but nor is there any harm in it. It is only in inductive logic that giving more reasons increases the probability of the result, and therefore also suggests (incidentally) its relative weakness.

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145 Still today, in Talmud study, people do not find it odd that a R. Ishmael rule might prevail in one context and a R. Akiba rule in another. Logically, one would have thought that just one of the systems would have to be adopted for the whole Talmud.

Our remark that **Talmudic (and indeed later Rabbinic) reasoning is very often inductive**, rather than purely and exclusively deductive, should be emphasized. It is contrary to popular belief (people are rather surprised when I suggest it), and so manifestly ignored by other writers that I would tend to claim it as original. If it is original, then it should be stressed as very important, among the most significant insights of the present work. In any case, it is evident and incontrovertible fact.

The idea is disturbing, not to say devastating, to many people, because induction is thought of as inherently more fallible than deduction, and it is difficult to juggle with doubt and dogma. But in all fairness the truth of the matter is that deductive reasoning can also in principle and often does in practice err, and that inductive reasoning is not in principle necessarily weak nor does it always go wrong in practice. Each case must be considered on its own merits; one cannot make sweeping statements for or against such broad categories of mental process.

Let us now briefly take a look at the tenor of the 13 *Midot* of R. Ishmael; we will have occasion further on to analyze them more fully[146]. We may distinguish three groups:

(a) *Midot* whose purpose is **to infer information** from the text, i.e. to make explicit what is implicit in it; this includes **rules Nos. 1-3 and 12**.

(b) *Midot* used **to elucidate terms** in the text, especially their extensional aspect; this includes **rules Nos. 4-7**.

(c) *Midot* serving **to harmonize** seeming or manifest incongruities in the text, including, as well as inconsistencies, mere redundancies, discrepancies, and other sources of perplexity; this includes **rules 8-11 and 13**.

> Admittedly, this grouping of the 13 *Midot* is a bit artificial. For, in a strict view, all inference of information is an eventual elucidation of terms and a prevention of inconsistency; and similarly, all elucidation of terms constitutes inference of information and harmonization; and likewise, all harmonization results in elucidation of terms and leads to inferences of information. Nevertheless, the immediate goals of these different movements of thought are sufficiently distinct to justify our subdivisions. A nice thing about these groupings is that they show a continuity of sorts in the approach of R. Ishmael, and explain and justify the sequence in which the *midot* were listed. The only misplaced *midah* in our view is No. 12, which should be closer to No. 2, or at least in the same group.

a. Inferences of information.

Rule 1, ***qal vachomer*** (lit. lenient and stringent), refers to a-fortiori, a form of argument whose conclusion is essentially deductive, though there are in practice inductive aspects involved in establishing the premises, as we have seen. Within Judaic logic, this form of reasoning has in fact served as the paradigm of deduction, much as Aristotle's syllogism (with which it is often confused) has had the honour within Western logic. The discovery of a-fortiori is, I would say, one of the most brilliant contributions of Jewish logicians to generic logic. It should be noted that a-fortiori has Biblical roots, as Jewish tradition has reported since Talmudic times if not earlier.

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146 See chapters 10-12, *infra*.

Rule 2, ***gezerah shavah*** (lit. equal rulings), refers to arguments by analogy, or more specifically inferences based on homonymy (similarity of wording) or on synonymy (similarity of meaning). Reasoning by analogy was very common among the ancients, Jewish and otherwise, until the advent of the scientific method in relatively modern times; it could range from far-fetched comparisons to very credible equations. Of course, most arguments, including syllogism, are based on analogies, since conceptualization depends on our intuition of similarities between apprehended objects. However, not until recently was it fully understood that the legitimacy of an analogy rests on its treatment as a hypothesis to be tested, and repeatedly tolerated (i.e. not rejected) and even confirmed (if predictive) by evidence, more so than its alternative(s). So analogy is essentially an inductive mode of thought.

While *gezerah shavah* is based on closeness of subject-matter, inferences from context appeal to the textual proximity of topics. Such logistical considerations are relatively incidental, but they lean on the fact that the text in question was written by an orderly mind. This form of reasoning includes: the rules known as ***heqesh*** (relating to two items in the same verse) and ***semukhim*** (relating to two items in adjacent verses), which are traditionally counted as aspects of rule No. 2 (though probably later inclusions under that heading); and rules classed as No. 12, ***meinyano*** (inference from immediate context) and ***misofo*** (inference from a later reference). Such reasoning has obviously got to be regarded as inductive, since however intentional the positioning of words, phrases or sentences, there have to be occasional changes of topic.

> A matter of related significance, note, is the assumption by R. Akiba that, in a Divine document such as the Torah, the choice and placement of words cannot be accidental; whence, no repeated word is superfluous and no missing word is insignificant, every letter counts, and so on. This view allows, indeed encourages, many an inference (or alleged inference). Be it said, R. Ishmael did not in principle agree on this issue, but considered that the Torah "speaks in the language of men".

The interpretations involved in analogical or contextual arguments may be intuitively reasonable enough, but they are not readily put in formal terms and are therefore difficult to validate systematically. In any case, applied indiscriminately, such arguments are bound to lead to difficulties - one line of reasoning may lead to one conclusion, and another to its opposite, there being no inherent logical protection against contradiction. And indeed, difficulties were often encountered. For this reason, many limitations were imposed on these rules; and ultimately, they were regarded as unusable without the support of an accepted tradition, or at least the approbation of the majority of the authorities.

Rule 3, ***binyan av*** (lit. father construct), seems to refer to causal reasoning; that is, to finding the causes (in a large sense) of differences or changes, and thus predicting similar effects in other contexts. In a legal context, this means finding the underlying basis of known laws, so as to be able to make coherent laws in other areas. Here too, argument by analogy is involved, and the mode of thought is essentially inductive. The way the rule is traditionally worded ("a comprehensive principle derived from one text, or from two related texts") gives a false impression that it refers to immediate or syllogistic inference; but we must look at its operation in actual practice to understand it, and in such event the role played in it by the process of generalization becomes evident. While such reasoning is relatively easy, nowadays, to express formally and control scientifically, the Rabbis (as we shall see) had a surprisingly hard time with it.

b. Elucidation of terms.

Rules 4-7, labeled collectively as ***klalim uphratim***, seem to concern class logic, to a large extent, as they involve the expressions *klal* (general) and *prat* (particular) in various combinations. Many arguments of this kind may be viewed as effectively proceeding from definable linguistic conventions - in the non-pejorative sense that they reflect certain uniformities of intent, in the style of Hebrew expression used by the Torah. For instances: the combination of a general term followed by a particular term, in close Torah verses or parts of a verse, yields a particular result (*klal uphrat*); whereas the reverse combination, of a particular term followed by a general term, yields a general result (*prat ukhlal*). As every writer or speaker knows, a maximum of information can be communicated in a minimum of words, through certain turns of phraseology. This seems to be the motive, here.

Well and good, thus far - in theory. But in actual practice the expressions *klal* and *prat* cannot always be taken at their face value. Closer acquaintance with practical applications of the *klalim uphratim* rules reveals that their logic is not quite identical with that of Aristotle. In Western logic theory, inclusions or exclusions between broader concepts (genera, overclasses) and narrower ones (species, subclasses), or classes and their singular instances (individuals), are purely mechanical procedures, which presuppose *clearly defined* terms. Such subsumptive arguments can be readily represented pictorially by circles within or intersecting or outside other circles, known as Euler Diagrams, and are the domain of Aristotle's syllogistic processes. But in the more Oriental logic of the Talmud, things are not so simple; terms are vaguer and may be taken to "imply" formally unrelated ones.

> The truth is that in practice, *even in Western thought*, terms are not always at the outset clearly defined; rather, usually, the definition of a term is arrived at through a gradual, inductive process, as we focus on the subject matter more and more, and acquire a deeper knowledge of it. Sometimes we do decide by convention to name a phenomenon whose description we have already; but more often, we name a phenomenon before we are able to express its essence in words, and then work our way by trial and error to a satisfactory definition of it. This developmental aspect is not yet well accounted for in the classical theory of class-logic.

Certain efforts at exegesis are rather contorted, and a great deal of fantasy and credulity are needed to accept them. R. Akiba's methodology, where the terms used for the purposes of inclusion or exclusion are ***ribui*** (broad) and ***miut*** (narrow), seems especially weird to our minds. For instance, "sheep" may imply "birds" or even "garments", without apparent rhyme or reason[147]. This is why Maimonides regarded such arguments as having a mere mnemonic

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147 In *Baba Qama*, as I recall, but I did not note the page. However, here is another example used by commentators, which is probably closely related. Consider, for instance, the sentence "For all manner of trespass, whether it be for ox, for ass, for sheep, for a garment, or for any manner of lost thing... he shall pay double to his neighbour" (Exod. 22:8). The question is, why after saying "all" are various specifics (ox, ass, etc.) mentioned? *Klal uphrat* understands them as having an *constructive* function, it starts with a minimalist thesis then expands it: "ox" *means* ox, and so forth. *Ribui umiut* gives them an *eliminative* function, starting with a maximalist thesis then successively contracting it: "ox" is mentioned *so as to exclude* land (which is immovable property, unlike oxen), "ass" and "sheep" to exclude slaves or bills (which differ from the given examples in certain unstated respects), "garment" to exclude the unspecific (such as unspecified quantity).

purpose[148]. Their conclusions were foregone[149], received in the chain of oral tradition; nevertheless, the Rabbis made a determined effort to anchor them, however flimsily, in the written Torah.

The best we can do to formalize such logic, then, would be to say that, *given* the tradition that the laws concerning a certain topic are X, Y, and Z; and that these laws are to be derived from a specified passage of the Torah, distinguished by the terms or phrases A, B and C; *then, if* X is related to A, and Y is related to B, *it follows that* Z is to be paired-off with C[150]. The formal logic involved is therefore conjunctive and hypothetical:

If A and B and C, then X and Y and Z;
and if A then X and if B then Y;
therefore, if C then Z.

However, apart from this aspect, it is frequently difficult to honestly find formal justification for such argument; that is, *how* the connective relations of the major and minor premises were in the first place established. When in such contexts the Rabbis are found to argue between themselves at length, the discussion often does not revolve around such basic issues of proof, but is merely a controversy as to *which* of X, Y, Z is to be paired-off (seemingly arbitrarily) with which of A, B, C. The only way then left to us, to explain the unexplained, is to appeal to 'tradition'.

c. Harmonization.

Rules 8-10, which start with the words ***kol davar shehayah bikhlal veyatsa*** (lit. whatever was in a general principle and came out), deal with sets of statements whose subjects are in a genus-species relation. Rule 8, although perhaps originally intended as one rule, has become traditionally viewed as having two variants, which we are calling ***lelamed oto hadavar*** and ***lelamed hefekh hadavar***; these concerns cases where the predicates are also in a genus-species relation of sorts. Rule 9, ***liton toan acher shehu kheinyano***, concerns predicates which are otherwise compatible; and rule 10, ***liton toan acher shelo kheinyano*** concerns incompatible predicates.

Rule 11, which also starts with the words *kol davar shehayah bikhlal veyatsa*, and continues with the words ***lidon badavar hechadash***, deals with situations where an individual changes classes and then returns to its original class. Rule 13, the last in R. Ishmael's list, ***shnei ketuvim hamakhechishim***, concerns other reconciliations of conflicting theses; note that this principle is to some extent reflected earlier in the present volume, in the section on *kushya* and *terutz*.

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148 According to what I was told by a teacher; I have not looked for the reference.

149 To illustrate this, a funny joke is circulated in Yeshivot: "How do you know you have to wear a yarmulke? Because it says *Vayetse Yacov*.... Would Yacov go out without a kipah?"

150 We might cite as an example of such reasoning Rashi's "if it does not apply", which Bergman clarifies as follows: "If the Torah indicates a halachah in a case or category where it is *already* known, then apply that halachah to *another* situation" (p. 120, my italics). Obviously, here, Rashi is appealing also to the R. Akiba principle that there is nothing repetitive or superfluous in the Torah. The problem remains, *which* other situation, and *how* is the choice to be justified!

All these dialectical principles are quite capable of formal expression, and (as we shall see) are mainly inductive in nature, involving generalizations and particularizations. There are some deductive, logically necessary, aspects to them; but on the whole, as complexes of intellectual responses to given textual situations, they favour one course over another, which is logically equally possible, if not equally probable, and therefore they constitute inductive mental acts.

> One might well ask why God, the ultimate author of the Torah, expressed Himself in so tortuous and confusing a manner, that necessitated such complicated interpretative principles, instead of speaking plainly and straightly. The answer I received from teachers when I asked that question was that His purpose must have been to conceal the truth somewhat, so as to stimulate Torah study. Also, if everything was made clear in a systematic and explicit manner, the Torah could be studied fully in isolation; whereas, God wished it to be studied in a more social manner.
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> Some also suggest as an answer, on the basis of qabalistic ideas, that if the Torah was perfectly explicit and unambiguous, then there would be no room for doubt in the world, and skeptics would have no opportunity to make the redemptive leap of faith, which is needed to safeguard human freedom of choice. If God was totally revealed, then humans would be forced, in fear and trembling, and out of infinite love, to surrender all personal will and identity. The diversity of the world was created and is maintained precisely through a concealment of some of the truth (for if the world is ultimately, in truth, unitary, then all appearance of plurality must be a sort of untruth).

So much for the content, in brief, of R. Ishmael's list of rules. Our analysis (above and below) somewhat justifies the order in which the rules appear in this list (except, as already stated, for rule 12). However, some of the groupings implied by this list are open to discussion. I would suggest that all inferences from context, including *heqesh* and *semukhim* (traditionally considered as subcategories of *gezerah shavah*) and *meinyano* and *misofo*, should have been grouped together under one heading (just as, for instance, *gezerah shavah* constitutes one heading with subdivisions). Especially, the *klalim uphratim* should, in my view, be reorganized, and counted as one heading, or as at most two (classifying each process according as its result is a *klal* or a *prat*)[151], instead of four. Finally, in my opinion, the two variants of *lelamed* ought to be regarded as separate rules, comparable to the two rules *liton toan acher*.

> A comment worth making is that the arrangement and numbering of the *midot* may not be stipulations of R. Ishmael, but may be proposals of the compiler R. Yehudah. To my knowledge (without having researched the matter greatly), R. Ishmael did not systematically group and list his *midot*, but merely formulated them and referred to them individually in various contexts as the need arose; it is probably R. Yehudah who later brought them together in a list, and organized them into 13 sentences in the given order. But the number 13 is not sacrosanct. According to Bergman, the Raavad noted the possibility of a count of 16 (counting rules Nos. 3, 7, 12 as two each); while others suggested counting rules 8-11 as one[152] and thus supposedly arrived at a count of 10. My preferred manner of counting yields the number 13-2+1=12.

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151 Including, appropriately separated, the two rules distinguished by the word *hatsarikh*, which are traditionally lumped together under No. 7. As later discussed, the treatment of complementarity as something distinct is an overreaction, in my view.

152 In my view, this is wrong. Rule 11 is functionally radically distinct from rules 8-10, albeit the common opening phrase. And rules 8-10 are sufficiently different in their premises and conclusions to justify separate treatment, even though they are obviously a related series. This will become clear further on.

> It must be noted that, judging by actual Talmudic and Rabbinic discourse, the inventory is incomplete[153]. Orthodox commentators would not accept this last remark, and try to explain away every silence or disagreement of R. Ishmael (or R. Yehudah) concerning some rule or some detail of a rule mentioned by other authorities, earlier, contemporary or later. Since they regard the 13 rules as (an oral) part of the Revelation at Sinai, they must explain why Hillel listed only 7 rules, or R. Eliezer listed as many as 32. For this reason we find Bergman making statements like "Hillel certainly did not intend to dispute the teaching of R' Yishmael," even though Hillel lived a couple of centuries before R. Ishmael![154]

Hillel's rules (which we shall label (**a**) through (**g**), to distinguish them from R. Ishmael's labelled numerically) are given in the *Jewish Encyclopedia* as follows:

Hillel's		**R. Ishmael's**
a	*qal vachomer*	**1**
b	*gezerah shavah*	**2**
c, d	*binyan av*	**3**[155]
e	*klal uphrat and prat ukhlal*	**4, 5**
f	*kayotse bo mimakom acher*	**?**[156]
g	*meinyano*	**part of 12**

Now, I have put in the last column my initial impressions as to correspondences; from which it appears that Hillel did not know (or use or list) at least seven of R. Ishmael's rules, namely 6-11, 12 (the *misofo* part), and 13, while he adds (or has another name for) one, namely (f). We might stretch our equations, and include rules 6 or 7 under (e); regard R. Ishmael's *misofo* as a special case of Hillel's *meinyano*; and maybe even assimilate eventual

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153 Other principles worth noting, which are in practice used for hermeneutic purposes, are *rov* (this statistical principle is usually associated with majority decision by judges, but it may also be applied to *matters of* judgment, as for instance in *Avoda Zara* 75b, where Num. 31:22-23 "every thing that may abide the fire" is understood by Rashi as referring to cooking utensils, since they are the metal implements *habitually* subjected to fire) and perhaps *hazakah* (which, again, is usually associated with the legal *status quo*, but in many contexts refers to empirical evidence). Note in passing, with reference to Num. 31:22, the mention of *iron* - which suggests that the Iron Age had started by 1300 BCE, whereas historians, supposedly on the basis of archeological findings, place it at closer to 1000 BCE, if I am not mistaken. See also **Appendix 3** for comments on Judaic numerology (*gematria*), and other such exegetic techniques, which count as aspects, however marginal, of Judaic logic.

154 Besides, how can one make conjectures about a past person's "intentions", without written record to support one's case, and say "certainly"?!

155 Bergman claims, in Raavad's name, that (c)=3 while (d)=13. But I do not see, judging from *J.E.*'s wording, how such a position is possible. I suspect a characteristic attempt to force facts to fit the comforting view that Hillel's list is a condensation of R. Ishmael's; it is significant that Bergman occults the actual wording of the rules in question in the original sources.

156 This rule is called *mah matsinu* by Bergman; it is interesting to note that *mah matsinu* is equated by Scherman to *binyan av*! The wording "as came out for it from another place" suggests some kind of inference of information, anyway.

cases of (f) under rules 2, 3, and 12. But it seems very unlikely to me that Hillel intended any of R. Ishmael's harmonization rules (8-11, 13).

It could well be, as *J. E.* suggests, that R. Ishmael gradually developed the latter additional rules[157] as "special applications" (I would prefer to say extensions) of Hillel's (e), since they concern subjects in a genus-species relation. But we must in any case admit that R. Ishmael's list of 13 was more than a mere rearrangement of Hillel's list of 7; there were clearly novel elements in it[158]. Similar patterns of development, involving subdivisions, collapsing of categories, and new issues, are apparent with regard to R. Eliezer's list of 32[159], judging by the data given in *J.E.* Note that if we refer to Shammai and R. Akiba, the problems of comparison and contrast become much more complicated[160]; and it would be very difficult to claim that these various authorities based their work on a common blueprint.

Not only does Talmudic logic have specificities in comparison to generic logic, but there are different logical trends *within* the Talmud itself. That is already clear in what we have said above, concerning the competition between the schools of Hillel and Shammai, or between R. Ishmael and R. Akiba. But the differences embodied in explicit principles may not reflect all the underlying differences; there seems also to be unstated differences, which were not brought out into the open. This refers to the concept of the ***shitah***: as is well known, there are leitmotifs which run through the legal rulings of individual Rabbis.

> Some Rabbis, for instance Hillel, tend to rule leniently; others, like Shammai, are reputed to lean on the side of stringency. The terms lenient and stringent, here, need not be considered as implying a value-judgment on our part. Hillel appears the warmer of the two, because he tends to ease people's obligations; but Shammai also cares for people, he just wants to make very sure they get to Heaven. (It is interesting to note, in passing, that in the French language the word *chamailles* to refer to endless quarrels! I have long suspected, though this is not the explanation given in etymological dictionaries, that the word was derived from the proverbial Shammai-Hillel controversy.)

What concerns us, here, is the possibility that different *logics* underlie these different tendencies. Say, someone utters what seems like a vow; how binding is it legally? One Rabbi might answer generously that the statement is binding only if it has a certain precise wording; it is to be taken at face value, *with a minimum of implications*, admitting as inference only what strictly necessarily follows according to generic formal logic. Another Rabbi might take the more severe view that, so soon as the utterance is articulated, all sorts of motives and intentions may be taken for granted as implied; little need be said to mean much. The latter

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157 *J.E.* does not include R. Ishmael's rule 13 in this remark. Concerning rule 13, *J.E.* says that it is "not found in Hillel".

158 Apparently, some orthodox commentators concede this point, since Bergman remarks "Some explain that when he [Hillel] expounded before the elders of Beseira, he required only these seven rules," implying the existence of other rules not expounded by him on that occasion.

159 As already mentioned, R. Eliezer's list is distinguished by its mixture of principles of merely Hagadic value with those of Halakhic value; the exegesis of inspirational stories is less strictly regulated than that of legal matters. I do not know first-hand how true these remarks are, but am just passing on information.

160 Is it to avoid bringing such problems out into the open that, apparently, no lists are traditionally given for Shammai's and R. Akiba's rules?

Rabbi seems to be referring to a more specific logical framework, in which there are unaccustomed relations among propositions.

To give an idea of the issue, here: in ordinary logic "all X are Y" does not imply "all Y are X"; but one can readily construct a special logical system in which such inference is acceptable. It would be onerous, make difficult the expression of all possible thoughts, but it is not unthinkable (since every form has a contradictory). It may well be such distinct (specific) patterns of formal logic underlie the differences in *shitah*. This is merely a speculation; but the idea seems worthy of follow-up. To demonstrate it decisively would require analysis of all of any given Rabbi's pronouncements, in search of uniformities.

2. Heuristics.

The hermeneutic principles were intended, as discussed in the previous section, to explain and justify the development of Jewish law from its Torah source. They were the methodological bridge between the Torah and the Mishnah and Gemara; the more or less logical techniques by means of which (to the extent that they are accurate renditions and exhaustively listed) the written foundation-document, together with the oral tradition, were transmuted into the Talmud.

However, a further set of principles is traditionally transmitted in Judaism, which reflects more broadly the transition from Mishnah to Gemara, and then from Talmud to subsequent Rabbinic Law, and finally the way Halakhah is actually *taught and studied*. These additional principles may be characterized as *heuristic* (practical rules of thumb), rather than hermeneutic (*a priori* methodologies), in that most of them constitute *ex post facto* summaries of certain uniformities in terminology[161], textual presentation and personal authority found in the Talmud. I say 'most', because some of them though listed together with relatively incidental rules of thumb, are more or less objective logical forms and would have been more appropriately listed together with interpretative techniques[162].

Many of the heuristic principles were already made explicit in the Talmud itself, reflecting the intelligence, self-consciousness and unity of purpose of its protagonists, recorders and redactors[163]; but some were evidently formulated in succeeding centuries, by Savoraim, Geonim, Rishonim and Acharonim. Among the current works in English which describe such principles, often in tandem with hermeneutics, we may mention again Steinsalz's *Reference Guide*, Bergman's *Gateway to the Talmud*, as well as Rabinowich's *Talmudic Terminology*[164] (whose introduction includes an excellent bibliography on the

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161 Note in passing that some terms are apparently reserved to Halakhic contexts, while others are reserved for Hagadic contexts (Rabinowich, p. xx).

162 The reason for their inclusion is usually to elucidate the terminology, rather than to deeply study their logical properties.

163 Judging by a chart in *Aiding Talmud Study*, there were a couple of hundred named participants over a period of some 450 years.

164 This work is, according to its author and as the full title implies, an adaptation of M. Mielziner's *Introduction to the Talmud*; New York, 1903.

subject[165]) and Feigenbaum's *Understanding the Talmud*. The last two of these books are summarized in **Appendix 4** for the reader's edification.

The primary function of traditional teachings is simply to enable the student to understand what the dense Talmudic text is all about. This presupposes, for a start, a knowledge of Hebrew[166], to follow the Mishnah, and of Aramaic, to follow the Gemara, including the ability to read and a certain amount of vocabulary and grammar. Practice is, of course, crucial, but theoretical accessories are also essential, both to begin with and as one proceeds. Such tools are provided to some extent within the text itself; but studying with a teacher, at least at first, is necessary for most people, and a relatively easy way to gather information and skill; additionally, there are quite a few written aids to Talmud study.

> The phrases used in the Talmud, as well as their meanings and the significances of their sequences, are not absolutely uniform and permanent, but do vary subtly from context to context, as well as (to a larger extent) from one geographical location to another and from historical period to historical period (in the different generations of Tanaim, of Amoraim, and of later Rabbis)[167]. The uniformities in vocabulary and semantics no doubt developed largely spontaneously, reflecting the idiom of time and place, although the Talmudic disputants and the compilers of the Talmud must have made some arbitrary conventions, too. As for the patterns of exposition, e.g. the rule that "if an anonymous Mishnah [containing only one opinion] precedes one containing a dispute, the Halakhah does not follow the anonymous Mishnah"[168], they must have been *ab initio* conscious conventions or at least *ex post facto* decisions supposedly based on research findings.
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> With regard to the rules of thumb, and their exceptions, concerning the relative reliability of deciders of the law, e.g. that "the Halakhah generally follows Beis Hillel over Beis Shammai, except..." for certain cases, they must be understood as after-the-fact summaries of information[169]. They were not prejudices imposed by Divine fiat, but final evaluations of the winners and losers in a multitude of unrelated disputes. In other words, such principles are statistical reports on personal scores, rather than reflections on substance or logical techniques; they cannot be used as proofs.
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> We have to take into consideration the historical development of this science[170] of Talmudic language, textual order and personal authority. There is an inevitable empirical element involved in the formulation of heuristic principles, since they are not (as it were) inscribed in Nature in the way Logic is, but depend on human factors. We may well wonder how much of the regularity described by the books on the subject is shaky assumption and how much of it is incontrovertibly established: i.e. what constitutes *evidence for*, and what *inference from*, the postulate that there is regularity; for if the

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165 The earliest work on terminology mentioned by Rabinowich, is *Sefer Keritot* by R. Samson of Chinon, 'one of the last French Tosafists (fourteenth century)'. Then we have the *Mevo HaTalmud* of R. Shmuel Ibn Nagrela 'HaNagid' (so-called, but wrongly according to M. Margolis). And so forth. Thus, according to Rabinowich's listing, the *systematic* development of such linguistic analysis is a relatively late phenomenon (Rishonim). More details on this question might be found in the *History of the Talmud* by Rodkinson (1903), mentioned on p. xiv, which I have not read.

166 For some quite incidental comments on the Hebrew language, see **Appendix 5**.

167 The contrast between Mishnaic Hebrew and the Aramaic of the Gemara or between the Aramaic of B.T. and that of J.T. being only the most obvious variations.

168 Bergman, p. 92.

169 See Bergman, p. 94. Even here, there are differences of opinion. For examples, some say that the law follows Beit Shammai rather than Beit Hillel in 6 cases, while some say in 3 cases; or again, some say that in disputes between R. Yehudah and R. Nehemiah, the latter wins, whereas the Rambam rejects this rule of thumb.

170 Talmudic language and organization has a history; and then *the study of* such history has its own history. To what extent the latter has been traced, and accurately so, I do not know. Evidently, some effort has been done, witness Rabinowich's bibliography; but a more thorough effort may be necessary.

assumption is an empirical generalization, rather than a before-the-fact convention, then it has to be studied much more carefully (since the law is affected by it).

The Talmud page is laid-out in a standardized way, with portions of Mishnah first, followed by Gemara commentary thereon, the latter being separated by the Hebrew letters '**mg** (GM.); later commentaries, including mainly those of Rashi and Tosafot, are normally included in the page, around the Talmudic text. It should be noted that, Semitic languages being basically consonantal, the text was originally written and published without *vowel signs*; and until recently this practice has been continued, partly because of uncertainties or different traditions concerning proper vocalization. Since the text is also devoid of *punctuation marks*, it is first necessary to identify where a sentence begins and ends, and its various clauses; what we include or exclude in a sentence, and how we cut it up into clauses, will obviously generally affect its meaning. Also, many *abbreviations* are used, which must be assimilated.

As Feigenbaum makes clear, a related issue is *the role* of the sentence in the wider context: is it a new topic or the continuation of an ongoing discussion; and if the latter, is it a question or an answer, and in relation to what? This implies the need to recognize and appreciate the function of every word, phrase, or sentence in each and every line of argument, and to keep track of who said what and why. Facilitating such apprehension and comprehension is the fact that there are recurring schemata; but even having prepared oneself by their theoretical study does not always guarantee one's ability in practice to correctly match the data and map the course of the discussion.

Talmud heuristics, judging by Rabinowich's excellent effort, consists of an ordered lexicon of terms, including, at a first level, ***terms found in the Mishnah***, then ***terms the Gemara uses to clarify its Mishnah antecedents***, and finally ***terms instituted by the Gemara for its own development***. Some terms can be characterized as analytical, as they help to define the subject-matter, referring to various aspects of its classification; this division mainly concerns the form and content of propositions, their terms, quantity, polarity, eventually also modality or conditions; and (to some degree) awareness of what is implicit in them. Some terms are synthetical, describing the logical or discursive procedures through which a formulated proposition has come to be considered and eventually become established or rejected.

The divisions and subdivisions of words and phrases appropriate to each context, differ considerably in Mishnah and Gemara, because of differences in the development of these two documents. The Mishnah is essentially a document intended to lay down predetermined laws; a relatively static picture of the law at a given time, an end-product. Whereas the Gemara is engaged, to begin with, in a studying and digesting process, and eventually, having acquired momentum, it develops the law further in the presence of the reader.[171]

So much, here, for the content of Talmud heuristics; we need not go into detail, duplicating the work of others. However, some broad critical comments on the subject are necessary. First, let us point out that if we wish to elicit from heuristic teachings some items of epistemological significance, we must look especially at all little notes their authors make

171 Baraitot often stir heated debate. Unlike Mishnaiot (which have primary authority), these pronouncements of Tanaim are not necessarily known to all Amoraim, and yet they have considerable authority (after Mishnaiot). For this reason, Baraitot often cause differences of opinion between Amoraim: those in the know having one opinion, and those not in the know having another opinion.

concerning *deviations* from the norm: terms used with variant meanings in certain contexts; different terms used for seemingly the same thing; unusual terms sometimes used by certain players instead of the standard terms used predominantly; Gemara contradicting or emending Mishnah, Savoraim doing same to Gemara; and so forth. It is precisely such limiting cases, which fall outside the traditionally stressed major norms, which should be carefully considered by us.

> We may refer to some examples of abnormal heuristics given in Rabinowich's treatise. The Gemara may indicate cases "not provided for in the Mishnah" (p. 62). This suggests that the Amoraim did not consider the Tanaim as omniscient, or at least as having foreseen all possibilities. The Gemara sometimes rejects a Mishnah, for one reason or another: "In one instance (*Niddah* 13b) the Mishnah is not accepted since the law it states is considered illogical!" and the Gemara will often consequently "make slight emendations in the text" of the Mishnah (p. 21); "in one instance (*Yevamos* 43a)", due to differences in decision for seemingly like cases, the Gemara states "this Mishnah is not authoritative" (p. 26). These examples suggest that the Gemara sages considered themselves fit to question the judgment of the Mishnah sages, rejecting material which in time becomes contrary to reason.
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> This is also suggested by the following example: "In fact, in one case (*Yevamos* 27b)" the Gemara "pushes aside a Mishnah in deference to a Memra of R. Yochanan!!" (who was an Amora) (p. 28). There are also suggestions that the Mishnah text had been adulterated by the time the Gemara reviewed it: "In, at least, two instances (*Chullin* 82a)," the Gemara cannot resolve a conflict between authoritative passages, "and must claim that a certain law is not really part of the Mishnah!" (p. 28); a Mishnah may also be corrected (p. 32). Baraitot were also occasionally ignored (p. 37) or corrected (p. 32), though that is less significant, since by definition, though of the same period as the Mishnah, they may have been intentionally excluded from it because not authoritative. The expressions "perhaps it is mistaken", "it should not be taught", and "it is not to be taken seriously" reflect this greater possibility of rejection in regard to Baraitot (p. 60).
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> Further on in time, we find cases of Savoraim making additions to the Talmud, for instance in *Yoma* 30b (p. 56), or again, according to one opinion, in *Pesachim* 102a-b (p. 45). This suggests that the Talmud was doctored after being sealed. More broadly, we should also consider discordances between sages of the same epoch: the Sages finding an argument of one of their colleagues strained (p. 59) or arbitrary (p. 69) or unconvincing; or finding his approach to an issue too vague or too fantastic or trivial (p. 64); or Sages being frankly stumped by a problem, unable to solve it (***teku***) (p. 63). Such events tell us something about the sages as individuals: their knowledge and reasoning powers were not necessarily perfect.
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> All the above applies to successive later generations of *poskim*, too. It all demonstrates the inductive nature of the development of Jewish law - and it cannot but be so, since human knowledge develops in response to phenomena. It is well known, also, that, as a consequence of being transcribed by hand over and over again, from copies on which readers had put their own handwritten commentaries, and sometimes as a consequence of censorship of parts of it by non-Jewish authorities, by the time of the Rishonim, many versions of the Talmud were circulating; and scholars had to labor mightily to detect the correct, or most likely, version[172]. That, too, is induction: observation and reasoning, hypothesis and confirmation or infirmation.

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172 Notably, Rashi, see Shereshevsky. Incidentally, it is shocking to learn that there have even been variant versions of the Torah! On this matter, Lewittes (pp. 44-47) informs us that the Talmud reports slight emendations in the text by the Soferim (*Nedarim* 37b - the Soferim appeared after the First Exile); he also tells how, in one instance, three Torah scrolls were found in the Temple which were not identical, and it was decided to adopt the reading common to two of them as valid (*Soferim* 6:4) - a simply statistical method, note well. Also note his comment: "Shortly after the period of the Talmud critical editions of Scripture were produced by the so-called masoretes, from whom we derive the present-day Masoretic text. They decided which version of the several existing ones should become standard..." though he rightly considers the matter of minor significance - rightly, because such fiddling presupposes a pre-existing document in many versions. But problems of this sort have recurred,

> We need not, here, belabor these matters further, though many more examples can be brought to bear from throughout the history of Jewish jurisprudence. In my view, such footnotes to Talmudic study cannot be taken lightly and dismissed as insignificant; they prove several things beyond shadow of doubt, such as: that later sages did not always defer unconditionally to earlier ones, but were willing to use their heads; that texts were often enough doubtful, so that there were breaks in the continuity of the transmission of Jewish law; and more broadly, that the law underwent a development, with growth and decay, changes and reversals.

It is interesting that even an author like Feigenbaum, who may be classed as very orthodox, acknowledges a development in the method and language of the Oral Law: "The Tannaim... began to organize it into a network of precise laws arranged by topics" - and eventually "*the material, methods of analysis, and modes of expression expanded greatly*" (p. 3, my italics). The fact is that the orthodox are usually loathe to admit that the law, and indeed its methodology, have undergone any *significant* change since Moses' time. Changes have to be glossed over as 'minor', for the simple reason that the Law would otherwise not be purely Sinaitic and therefore entirely Divine in origin.

However, the reader has only to examine a work like Lewittes' *Principles and Development of Jewish Law*[173] to see that there has undeniably been change over time, most often in the way of expansion and increased density, and often enough in the way of contraction or simplification. Practices may be added or abandoned, specified in increasing detail or become less demanding. How such changes, viewed collectively, are to be frankly reconciled with the Biblical injunction not to add to or subtract from the Law (Deut. 4:2; 13:1) is unclear - and that is the reason why the matter has to be glossed over. Similarly, study of works on hermeneutics and heuristics clearly shows that there have been variations in Judaic logic[174].

> One suggestion I can make here, to resolve the inherent ideological problem, is that we distinguish between 'a general delegation of authority' and 'an endorsement of all the particular expressions of the authority'. That is to say, God may well say to us: your wise men of each generation and locality have My sanction to enact and enforce laws, without thereby implying that these laws must be the same everywhere and for all time. Just as, in the secular realm, the king (in a kingdom) or 'the people' (in a democracy) grants its chosen government (the executive, the legislative and the judiciary) the power to make laws, without implying that it cannot later revise these laws, as it may reasonably need to as circumstances change, within limits defined by some Constitution - so in the religious realm may God do so.
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> The mere fact of delegation of authority does not make immutability imperative and adaptation forbidden. Indeed, the Torah passage in question specifies the judges "*in those days*" (Deut. 17:8-13), reflecting an awareness that man-made laws, even those with general Divine sanction, may well need to be modified, as knowledge and social conditions evolve[175]. In no way does such delegation of authority

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judging by a comment in Cohen that Rashbam "apparently reads *alecha* 'concerning thee,' not *lecha* as in the editions" (p. 166). More broadly, there are many apparent inconsistencies (in names, spelling, numbers, etc.) in the Tanakh, which could well be ascribed to mistakes of the writers or to scribal errors, though orthodox commentators go to great lengths to explain them away in other ways; for instance, *dodanim* in Gen. 10:4 is written *rodanim* in 1-Chron. 1:7 (the Hebrew letters *d* and *r* are easily confused). See Mitchell pp. 31-32, and also 101-102.

173 See for instance ch. 6, but the whole book is well worth reading.

174 Examples may be found scattered in the present work.

175 Logicians have called the tendency to classify objects with reference to their past characteristics, rather than with respect to their eventual new attributes, commission of the "genetic fallacy". This is an inductive fallacy, of course, in that it reflects a mental rigidity, a failure to empirically

logically necessitate that earlier judges be regarded by later ones as perpetually right, as having divine powers of omniscience and infallibility, but it is only suggested that they are likely to be the wisest for their time and place. If, say, today, our judges, reviewing the status of women, perceive them differently than previous generations did, in the light of a more open intellectual and societal atmosphere, they may well revise certain laws relating to women, without thereby insulting past sages, or denying the sages in general Divine sanction and invalidating their work.

Nowhere is it demonstrated formally that later sages need rigidly comply with all rulings of the earlier. Such a principle of compliance is taken for granted by current orthodoxy, as an established tradition, but there is no real textual basis for it. A circular argument is required of us: we have to believe in the tradition because the tradition tells us to believe in it. But, I say, there has to first be some kind of more authoritative justification, standing outside the tradition. For example, women cannot be called to the weekly Torah reading, not because the Law originally forbade it, but because of 'the community's honour'. Perhaps in those days communities generally had such reactions; but what if today, in many communities, that is not the case anymore?[176]. The reason proposed by the ancients reinforces itself, instituting social habits, but it has not been considered at a sufficiently radical level.

3. A Methodical Approach.

Although logic is ever-present in Jewish thinking, it is not as explicitly referred to as it ought to be, in my view. *Talmud Torah*, i.e. Biblical and Talmudic studies, constitute a powerful logical training, and the extraordinary success of Jews in all other fields is in large part, directly or indirectly, attributable to this training. Nevertheless, we could do better - much better.

Biblical exegesis could be improved by a more conscious application of logic. What precisely has been, or can be, logically inferred from each and every sentence and wording of the Torah, and by means of which specific form(s) of argument? Commentators give explanations, but they rarely specify their precise sources, whether they are purely traditional or whether they are based on reasoning. I imagine a book which would collect next to every verse all the lessons to be learned from it, and just how. Judaism constitutes a mass of beliefs, most of which are implicit if not explicit in the Torah. For instance, the belief in Providence is not only based on abstract statements (like, say, that in the second paragraph of the *Shema*), but is also suggested by various concrete stories.

But especially in Talmud studies, I believe a great improvement to be called for. A section of the Talmud which describes all the complex arguments and counter-arguments concerning a specific issue, is known as a ***sugya***. The Talmud is naturally subdivided into a large number of sections; some are brief, some are very long. The Mishnah makes a statement; the Gemara finds some difficulty in it, in relation to some other Mishnah or to a Baraita, and debates the issue; later commentators enter the discussion: Chai Gaon, Rashi, Tosafot, Moshe Feinstein. More and more subtle questions are raised, finer and finer distinctions are made, until everyone is satisfied, or silenced.

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monitor objects of study for possible changes in their identity. Progress must be allowed for in our perceptions and conceptions.

176 Many women today are evidently 'respectable' in any sense of the term understood for men; the Swiss *Conseillère Fédérale* Ruth Dreyfuss comes to my mind. Another group which seems to me wrongly despised by the Talmud are deaf-mutes; today, we know their true abilities.

It appears, and I do not deny it, that experts in the field are able to follow these complex arguments, without even the need for pen and paper; their minds are quick and in perfect working order, and their intelligence is great. But for a dull wit like mine, and I do not think that I am far below average, all this is hard to follow without a more point by point approach. I personally know only too well, from repeated experience, how an argument may seem very convincing on the surface, and then be found by applying the methods of formal logic to be erroneous, or at least in need of revision.

I would like to see each *sugya* patiently analyzed, in such a way that all its arguments are rendered entirely explicit, line by line, and it is demonstrated that all possibilities have been taken into consideration, and no other conclusions than those traditionally proposed are drawable. If there was an area of doubt, and a *psak din*, a ruling by the authorities, was made, so well and good; the law need not be based exclusively on logic. But the logic involved must in any case be made clear, to be fully justified. *A whole book might be written about each sugya*, if necessary. There is great scope for scholarly study in such an approach, and it would surely highly revive and stimulate interest in the Talmud.

Our proposal may seem to go against the tradition that the Oral Law be kept as oral as possible. But the truth is that this tradition has been virtually ignored since the redaction of the Mishnah and of the Gemara: look at all the written commentaries which have made their appearance since then. All I am advocating is the collection of all the authoritative writings, concerning any given *sugya*, and their exact ordering with formal logic in mind. That is only a kind of supercommentary, one might say. In any case, there is nothing to hide from non-Jews; their scholars know the languages involved, and can study the original texts, anyway, if they care to. On the other hand, the Talmud might in this way be made more accessible to the modern Jew; and surely that is what counts the most.

The following is a succinct illustration of what I mean; how I would like to see the Talmud studied and taught. The example is partial, but it suffices (in any case, these are the only notes I took!). It is drawn from tractate *Berachot*, p. 14. The *sugya* arises out of a difference of opinion (*machloqet*), between Sheshet on the one hand, and Rav and Shmuel on the other, about whether or not it is permitted to "verbally salute" someone "before prayer"; further complicating the matter, the terms involved have alternative interpretations. Note the symbols I insert, to abbreviate the discussion.

P: **One can say hello before prayer** (Sheshet).

Q: **One cannot say hello before prayer** (Rav & Shmuel).

(Note in passing that these propositions are modal; the type of modality involved is ethical: "can" here refers to permission, and "cannot" to prohibition.)

At first sight, P and Q are contradictory; however, it turns out that:

"*Say hello*" may mean:

a) seek out to say hello, or

b) chance to meet and say hello.

(Note that "seeking out" may be viewed as a special case of "chancing to meet"; so that P(a) implies P(b), and contrapositely Q(b) implies Q(a), for any given value of the other term (c or d).) Also:

"*Before prayer*" may mean:

c) before starting to pray, or

d) before completing prayers.

(Note that "before completing prayers" is understood as covering *all* the time before, including that "before starting to pray"; so that P(c) implies P(d), and contrapositely Q(d) implies Q(c), for any given value of the other term (a or b).)

Each of the given theses may thus, according to the terms involved, have four meanings. Thus, P may mean P(a,c) or P(a,d) or P(b,c) or P(b,d); and similarly for Q. Our goal is now to determine which combinations of P and Q, in their various senses, are formally consistent, implying a possible marriage of the two positions. The method used is one of elimination.

If P and Q have precisely the same subscripts, they are formally mutually exclusive, since one says "can" and the other "cannot". Thus, the four conjunctions like "P(a,c) and Q(a,c)" are self-contradictory and can be eliminated from further consideration. What, however, the remaining twelve conjunctions? We can eliminate a few more of them, by using a-fortiori arguments.

First, if one cannot chance to meet and say hello, then one cannot seek out to say hello. That is, P(a) and Q(b) are contraries, for a given value of the other term (c or d).

Second, if one cannot say hello before completing prayers, then one cannot say hello before starting to pray. That is, P(c) and Q(d) are contraries, for a given value of the other term (a or b).

These a-fortiori arguments enable us to eliminate five more combinations of P and Q, namely: for the first reason, "P(a,c) and Q(b,c)", "P(a,d) and Q(b,d)"; for the second reason, "P(a,c) and Q(a,d)", "P(b,c) and Q(b,d)"; and, for either or both reasons, "P(a,c) and Q(b,d)". Which leaves us, so far as I can see, with seven internally consistent conjunctions of the two theses:

1. P(a,d) + Q(a,c) = one can seek out to say hello before completing prayers, but one cannot seek out to say hello before starting to pray.
2. P(b,c) + Q(a,c) = one can chance to meet and say hello before starting to pray, but one cannot seek out to say hello before starting to pray.
3. P(b,d) + Q(a,c) = one can chance to meet and say hello before completing prayers, but one cannot seek out to say hello before starting to pray.
4. P(b,c) + Q(a,d) = one can chance to meet and say hello before starting to pray, but one cannot seek out to say hello before completing prayers.
5. P(b,d) + Q(a,d) = one can chance to meet and say hello before completing prayers, but one cannot seek out to say hello before completing prayers.

6. P(a,d) + Q(b,c) = one can seek out to say hello before completing prayers, but one cannot chance to meet and say hello before starting to pray.
7. P(b,d) + Q(b,c) = one can chance to meet and say hello before completing prayers, but one cannot chance to meet and say hello before starting to pray.

This listing does not terminate the analysis. The next step would be to determine the interrelationships between these combinations. Some are incompatible, because the P part of one has the same terms as the Q part of the other; for instances, Nos. 1 and 6 are contrary to Nos. 4 and 5. Some imply others, in view of the relationship (above mentioned) between the terms a and b, or c and d. Thus, for instances, No. 2 implies No. 3; No. 4 implies No. 2, and therefore also implies No. 3; No. 5 implies No. 3. Some combinations may be neither contrary, nor involve implications, and would in that case be taken as merely compatible. We may also want to linger on each statement and consider just what it means; for instance, No. 1 seems to imply a permission to seek out to say hello in the middle of prayer.

I will not pursue these details further, but will only add: it is only *after* all such preparatory formalities, that we may begin to wonder about the positions of different Rabbis. Granting that the purpose of the whole *sugya* is to reconcile the apparently divergent opinions of Sheshet and Rav/Shmuel, logic leaves us with seven possible harmonizations; it is thereafter up to us to find ways to narrow the list yet further. What the Gemara decided, how the various Rishonim leaned, what the Acharonim say, and what precise arguments were brought in from elsewhere - all that concerns only the seven *leftover* combinations.

If the reader is confused by the above labyrinth of reasoning, it would indeed please me! Because, that would prove my point, namely that only the most exceptional minds could possibly go through this process with certainty using only their heads, without material supports. There is no way to be sure that all alternative possibilities have been covered, without some such systematic approach. It would be hard for any normal person to honestly say that they can zip through such complex logical processes, without seeing them black on white. Even if a teacher orally described things step by step, it would be difficult for a student to retain all the details in memory from start to finish, and thus be sincerely convinced. In any case, a good background in logic theory would seem essential.

> Incidentally, I have had the unfortunate experience of some Talmud teachers who rush through a *sugya*, with little concern for *communication*. They seemed more bent on an ego-trip, to appear of superior intelligence - or to hold by some arbitrarily imposed time-table (which conveniently excused their skimming over difficulties). But the goal of teachers should be, and supposedly it is the goal of most, to address the unique human minds of their students, and *effectively* transmit *convincing* information to *them*, rather than to the surrounding airspace. The value of the face to face encounter is precisely that the teacher answers the questions which bother the student. One student, be it out of naivety or obtuseness or out of greater knowledge or intelligence, may have no problem with a certain point; while another, for whichever of those reasons, has a hard time assimilating the same information in his specific knowledge-context. There is no virtue in glossing over difficulties; good thinking is relentless, it goes all the way.

Even so, while admitting the value of properly assisted learning, my appeal here is still for a thorough, written exposition and elaboration of all Halakhic arguments, *sugya* by *sugya*. Only such a review, performed by experts in both logic and Rabbinic decisions, can render the

logical undercurrents of the Talmud and its commentaries entirely transparent, and make possible the demonstration of the high standards of logic involved in orthodox reasoning. I believe, out of faith, that it is possible; but in any case, the Halakhah can only gain from such a programme. For if there happen to be areas of weak logic, they will not put everything in doubt, but simply present opportunities for new debates.

More broadly, it would be of great value to methodical researchers and students of the Talmud and its Commentaries to have simply *a table of contents, an index, a concordance*. I have not seen such a document, but I am told that it already exists; if not, today with computers it should be easy to do (though perhaps expensive). There is a need of transparency, not only at the level of specific arguments, but equally at the level of making the literature as a whole susceptible to organized and systematic inquiry. For instance, assembling together all pronouncements on any topic under investigation - so as to have a true, unbiased, balanced picture of what has been said by all authorities on the subject concerned, and so as to be able to trace precisely the historical evolution of laws and attitudes.

10. THE THIRTEEN *MIDOT* (I).

In the present and next two chapters, we shall indulge in a closer scrutiny and frank criticism of Talmudic/Rabbinic hermeneutics. In this first part of our analysis of the Thirteen Midot of R. Ishmael, we shall deal with Rules 1-7 and 12.

1. Exposition and Evaluation.

Traditional presentations of the principles and practice of Rabbinic exegesis consist in listing the Thirteen *Midot* of R. Ishmael (at least, though other techniques may be mentioned, in contrast or additionally), describing roughly how they work, and illustrating them by means of examples found in the Talmud or other authoritative literature.[177]

Such an approach is inadequate, first of all, because the theoretical definitions of the rules are usually too vague for practical utility, and for purposes of clear distinction between similar rules. A simple test of practicality and clarity would be the following: if well defined, the rules should provide any intelligent person with a foolproof procedure, so that given the same database as the Rabbis, he or she would obtain the same conclusions as they did. The second important inadequacy in the traditional approach is the near total absence of evaluation; there are no validation procedures, no reductions to accepted standards of reasoning. There is no denying the genius of R. Ishmael and others like him, in their ability to abstract rules of intellectual behaviour from the observation of their own and their colleagues' thought-processes in various situations. Nevertheless, as we shall see, their failure to treat information systematically and their lack of logical tools, yielded imperfect results.

We shall here propose some original ways to expose and evaluate Rabbinic hermeneutics (mainly, the 13 *Midot*). The most important step in our method is **formalization**; this means, substituting variable-symbols (like 'X' and 'Y') for terms or theses of propositions[178]. Formalizing an argument, note, means: formalizing all explicit and tacit premises and conclusions. The value of this measure is that it helps us to clarify the situations concerned, the Rabbinical responses to them, and the issues these raise. By this means, we move from a level akin to arithmetic, to one more like algebra. When we deal in symbols, we

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177 The present analyses were made possible thanks mainly to Bergman's detailed presentation of the 13 *Midot*. Though I dislike that author's pompous tone and unquestioning fanaticism, and disagree with many of his specific positions, he is to be commended for his unusual efforts to clarify the hermeneutic principles. All too often, authors are simply content with listing examples with a minimum of reflection; he at least tries (if not always successfully) to sort out logical relations explicitly.

178 The formalization of *relations* is not technically valuable (apart from saving space), and tends to alienate and confuse readers; for these more abstract features of propositions, we shall stick to ordinary language.

reduce immensely the possibility of warped judgment, due to personal attachment to some solution; all problems can be treated objectively. It should be said that logical formalization is not always the most appropriate tool at our disposal; in some cases, epistemological and/or ontological analyses are more valuable.

- We have two sets of data to thus formalize, or analyze in some manner: (a) the *theoretical pronouncements* of Rabbis (defining or explaining the rules, or guiding their utilization), and (b) the *practical examples* they give in support (illustrating or applying their statements). This work allows us to compare, and if need be contrast, Rabbinic theory and practice. As we shall see, they do not always match.
- Another utility of formalization or similar processes, is the possibility it gives us for *comparing Rabbinic conclusions to the conclusions obtained by syllogism or other such established logical techniques*. This is the ultimate goal of our study, to determine without prejudice whether or to what extent Rabbinic hermeneutics comply with deductive and inductive logic. As we shall see, they do not always parallel the course taken or recommended by ordinary logic.

In anticipation of such divergences, it is important to study the Rabbinic hermeneutic principles carefully, and distinguish between their *natural* factors and their *artificial* factors. The natural aspects are immediately credible to, and capable of formal validation by, ordinary human logic, and thus belong to secular epistemology. The artificial aspects, for which Rabbis claim traditional and ultimately Divine sanction, are controversial and require very close examination, for purposes of evaluation or at least explanation. Our task with regard to such additives is to consider whether the rationales for them offered by the Rabbis are logical and convincing, or whether these factors ought to be regarded as human inventions and errors.[179]

We shall in the rest of this chapter, and in the next, deal with the 13 rules of R. Ishmael under three large headings. “Inferences of information” - including rules 1-3, and 12, i.e. *qal vachomer* (a-fortiori argument), *gezerah shavah* (inference by analogy), *heqesh, semukhim, meinyano, misofo* (contextual inferences), and *binyan av* (causal inference). Then “scope of terms” - including rules 4-7, referred to collectively as *klalim uphratim* (genera and species). Finally, “harmonization” - including rules 8-11, and 13, about which much will be said.

It should be clear that we have no intention, here, of masking any difficulties, but propose to engage in a “warts and all” exposé. The technicalities may be found hard-going by many people, but both secular and religious scholars, who endure through the ordeal, will be richly rewarded. They will find, not only an independent audit of Rabbinic hermeneutics, but a methodological demonstration of universal value. By the latter remark, I mean that the same method of exposition (by formalization) and evaluation (with reference to formal logic) can be applied to other movements of thought in Judaism, or outside it, in other religions or other domains (philosophy, politics, or whatever).

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179 We may regard the Rabbinic principle *ain mikra yotse miyedei pheshuto* (quoted by *Enc. Jud.*, p. 371, with reference to *Shab*. 63a and *Yev*. 24a, and there translated as "a Scriptural verse never loses its plain meaning", with the added comment "i.e., regardless of any additional interpretation"), as an implicit recognition that interpretations using the hermeneutic principles were not always natural. It may be asked how they managed to mentally accept conflicts between a *midah*-generated reading and a simple reading (*pshat*), given such a principle!

2. Inference of Information.

We shall first consider the exegetic rules whose purpose is essentially to infer new information from passages of Scripture, rather than to elucidate or harmonize the text (the division is, admittedly, to some extent arbitrary). Included here are both deductive and inductive processes, of varying degrees of formality and certainty.

✡ We have treated ***qal vachomer*** (R. Ishmael's **Rule No. 1**) in considerable detail already, and need only here remind of certain details. This refers to a natural thought-process, **a-fortiori inference**, the most deductive form of Rabbinic argument. The Rabbis of the Talmud and those which followed them, although they had an exceptionally well-developed understanding of this form of argument, did not have a complete understanding of it, such as one might expect in the event of Divine revelation. Their knowledge of it was not formal; they did not clearly distinguish inductive and deductive stages of reasoning; they misconstrued certain applications of the *dayo* principle[180]; and they erroneously counted the number of a-fortiori examples in the Tanakh.

> It ought to be remarked that R. Ishmael's formulation, just '*qal vachomer*', is very brief - at best a heading; he does not define the processes involved. The distinction between *miqal lechomer* and *michomer leqal* is not given in the list of Thirteen *Midot*; I do not know whether it is explicitly found in the Talmud or only in later literature. To what extent were the Talmudic and post-Talmudic Rabbis aware of the difference between positive and negative a-fortiori; did they ever note the distinction between copulative and implicational forms of the argument, did they use the secondary forms; at what point in history were the more complex Rabbinic formulations that we find in contemporary literature developed: these are all questions I ask myself, but have not researched the answer to. Historians of logic have still much work to do.

With regard to the legitimacy of the use of a-fortiori argument. We validated four (or eight) primary moods, namely copulatives, subjectal or predicatal, positive or negative (and implicationals, antecedental or consequental, positive or negative) and a number of derivative secondary moods. Since the process has naturally valid moods, it follows that *if* these moods are used properly, no formal objection to their use in contexts not sanctioned by tradition is possible. Tradition can only restrict their use with reference to the inductive preliminaries (as we discussed under the heading of objections); but with reference to the purely deductive aspects, no Rabbinic legislation is possible[181]. It would be like trying to conveniently exempt oneself from the obligation of honesty or consistency!

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180 I am referring here to the Rabbinical subdivision of the *dayo* principle discussed earlier, in ch. 4, footnote 10.

181 Notwithstanding, the Sages were, in my view, very wise to reject corporeal punishment for breach of prohibitions discovered through *qal vachomer* argument, or for breach of Torah prohibitions whose penalties were inferred through *qal vachomer* argument. In practice, we can rarely if ever be 100% sure of having freed our deductions of all possible material uncertainties; and therefore some injustice might be caused. What is true of *qal vachomer*, the most deductive of Talmudic arguments, should be all the more true of the other hermeneutic principles. (According to *Enc. Jud.* pp. 371-2, this canon concerning inferred prohibitions or penalties, is R. Ishmael's: *ain oneshim min hadin*; R. Akiba disagreed. We are referred to *J.T. Yev.* 11:1, 11d.)

The same freedom of thought must be acknowledged for all other purely deductive processes (or stages of processes), such as opposition, eduction, categorical or conditional syllogism, production, apodosis, and so forth. Any Rabbinic restrictions in such areas would be tantamount to an advocacy of antinomy, and cannot be tolerated. Rabbinic interference, on the grounds of some special Divine dispensation delivered at the Sinai revelation and transmitted by oral tradition, can only conceivably be applied to inductive processes; that is, with regard to situations which allow for *more than one* possible answers to a question, it is conceivable that there be a Divine decree as to which answer to favour in some specified situation(s) or all situations. However, we must keep in mind that the *conceivability* of such powers does not constitute proof that they exist in fact; it only makes logically possible a claim but does not justify it; and furthermore, that any controversy surrounding such powers throws doubt on their legitimacy.

✡ The technique of ***gezerah shavah*** (**Rule No. 2**) is also based on a natural thought-process, though a more intuitive and trial-and-error one. It consists in **inference by analogy**. The expression means "distinctive sameness", and therefore refers to the fundamental epistemological processes of *comparison and contrast*, which are jointly the basic technique of all concept formation. Applying them to textual analysis, we would quite naturally (i.e. without need of special communication or dispensation of Divine origin) look for homonyms and synonyms, to understand the language used and its conceptual references. In all discourse, we may find labels used which are analogous (similar in root, if not identical words), and apparently have similar or various meaning(s) in different contexts; or we may find different labels used in different contexts, with apparently the same meaning intended.

The scientific-minded approach to *gezerah shavah* would run somewhat as follows. The meaning of a label, i.e. a word (every letter identical) or group of words (phrase), or word-root (having certain common consonants, in the same sequence; though possibly with some different vowels and consonants which indicate, on a wider grammatical basis, varying inflexions) or group of word-roots, is suggested by the various contexts in which it appears in the text(s) concerned, as well as in other texts and current usage, and through comparative etymology.

1. **Homonymy**: If *a, b, c...* are all the occurrences of a label, and their assumed meanings (based on the above suggested methods) coincide, and no other assumed meaning(s) would be as coherent, then it may be assumed that the proposed single meaning is the intended meaning. If in some isolated context(s) the meaning of a label is uncertain, and it is coherent everywhere else, the same meaning can in all probability be generalized to the uncertain instance(s). But if the label is *ambiguous* elsewhere, there being one assumed sense in some contexts and some other sense(s) in others, then if no clear differentiating conditions are apparent, the sense most frequent elsewhere (if any) is the most probable, though some doubt remains.

2. **Synonymy**: If *A, B, C...* are various labels and their assumed meanings (based on the above suggested methods) are unambiguous, and mutually identical or at least similar everywhere they occur, and not even conditionally dissimilar anywhere, then these labels may be considered to be equivocal and interchangeable; that is, they are different labels for the same thing. If in some isolated context(s) the meaning of a label is uncertain, and it is coherent everywhere else, the same meaning can in all probability be generalized to the uncertain instance(s).

Once the general meaning of a label or the equivalence of various labels is established, statements with the label(s) concerned may all be assumed to refer to the same subject-matter. A detailed example of the kind of analysis and synthesis here referred to may be found in the present volume, in our study of a-fortiori in the Tanakh (ch. 5-6).

> A traditional example of *gezerah shavah* is given by *Enc. Jud.* (with reference to *Pes*. 66a). The expression *bemoado*, meaning 'in its appointed time', is used both in Num. 9:2, concerning the Pascal lamb, and in Num. 28:2, concerning the daily offering (which includes the Sabbath); it is thence inferred that the Pascal lamb may be offered on a Sabbath (coinciding with Pessach), even though this entails activities forbidden on other Sabbaths.

It is obvious that such reasoning is highly intuitive and dependent on one's overall context of knowledge. It is built up from the perception of words and the conception of their possible relations. The initial *insights* into possible meanings derived from immediate and wider context are conceptual acts dependent on the faculty of imagination; and subsequent *ordering* of the data, though a relatively mechanical process, is a function of the amount of data available at the time and taken into consideration. Such judgments can in no wise, therefore, be considered to have deductive value, but are eminently inductive.

With regard to Biblical text, we have little material to refer to, other than the document itself. This means that our conclusions are virtually pre-determined, since the data available are finite, even if they constitute a sufficiently large and varied sample of the Hebrew of the time concerned. Actually, sometimes a word or phrase is only used once in the whole document, and its meaning becomes a subject of conjecture; obviously the more often a label appears in the text, the more certain its meaning. With regard to Hebrew usage later in history, it is of course very significant[182], but it must be kept in mind that it has been and still is culturally influenced by the interpretations suggested by the Rabbis, and therefore it cannot necessarily be used to further justify those interpretations.

The natural interpretative process is adductive: an idea is floated, then tested in every which way for consistency[183]. It is, for this reason, susceptible to abuse. One may too easily stress similarities and ignore significant differences; and thereby stretch the application of an idea beyond its rightful borders. Or again, one may ignore similarities and emphasize incidental differences, and thus artificially restrict an idea. This is true of all argument by analogy; and *repeated consistency-checking in an ever wider context of information provides the natural protection against error*, as in all induction.

> Now, such a relaxed and patient attitude can hardly be practical in a legal framework, where some decisive position may be required 'right now'. On the other hand, the necessity to decide does not logically imply an impossibility to reverse the decision taken, later, in the context of new knowledge or modified conditions. The Talmudic authorities had debated matters and come to various conclusions which seemed wise to them. However, post-Talmudic authorities, intent on preserving these very decisions, proposed additional clauses to the hermeneutic principles which were to ensure they always resulted in the same conclusions, no matter how the data-context changed.
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> Thus, in relation to *gezerah shavah*, they claimed that the Sages were occasionally informed by tradition as to which topics were open to legal analogy, but left to find the verbal analogy which would justify it; or again, that the Sages were in some instances informed of words which could be used for such inference, but allowed to find appropriate circumstances for their use; or again, that the Sages were

182 We are not here dealing with a dead language, so the job is less difficult.

183 e.g. does 'take' (*qach*) *always* signify acquisition by monetary payment, or must other meanings of the term be supposed, and if so how are they to be distinguished? It is not enough that an analogy is applied in one instance (without problems ensuing from that one application); it has to be tested in all other cases where the term appears, throughout the text at hand.

told in advance the number of valid *gezerah shavah* arguments there would be![184] Now, I find all that hard to believe. Not only because it is very surprising that such alleged 'information' is (apparently) not explicitly mentioned by the protagonists themselves, but only makes its appearance in writing centuries later; but because the transmission scenario itself is unreasonable.

Is it plausible that serious teachers would pass on vital legal information to their students in the form of *riddles*? Why would they engage in such games, and not get to the point, if they had the information? One cannot imagine a functioning law system in which it is not the law and its justifications which are transmitted from generation to generation, but conundra. For then, one would have to consider that the laws in question (i.e. those to be inferred by such means) had been inoperative until their formulation in the Talmud. In which case, surely, the more basic thesis that the law has gone on unaffected by time since Sinai - the very thesis these artifices were designed to defend - would be put in doubt. It seems obvious, therefore, that the above mentioned additional clauses are *ex post facto* constructs[185], based on no actual oral or written tradition.

The controversies surrounding yet other additional clauses to the *gezerah shavah* process, provide still more cause for suspicion that such additional clauses are not Sinai traditions, but later constructs (in this case, Talmudic)[186].

Thus, it is taught that the applicability of the *gezerah shavah* method depends on the 'freedom' of its middle term in one or both of its manifestations. This refers to whether each manifestation of the middle term involved, through which a legal factor is to be passed over from one issue to another, has already been utilized to justify some other Halakhah. Such a concern presupposes a principle that *each unit of information in the Torah can only serve for one inference*[187]; generic logic has no such restriction (a premise can be used in any number of arguments), but let us grant it to be a tradition. On this basis, three possibilities are considered: that the middle term is (a) 'free on both sides', (b) 'free on one side only', whether the source side or the target side, or (c) 'free on neither side'. Authorities say and agree among themselves that a *gezerah shavah* inference of type (a) is irrefutable. With regard to type (b), some say it is always valid, while others regard it as conditionally valid. With regard to type (c), some regard it as conditionally valid, while others say it is always invalid.

Similarly, there is a debate as to how much legal detail a *gezerah shavah* allows us to pass over from premise to conclusion. There is also a debate as to whether once legal data has been transferred in one direction, other data may be transferred in the opposite direction, so as to equalize both sides, or whether the process is more restricted. It is irrelevant to us, here, which opinions are correct in these various debates - what is significant is simply the fact that there are at all disputes on matters so crucial.

Regarding the 'freedom' (*mufneh*) concept, an interesting remark may be added: it can be viewed as an attempt, albeit a rather primitive one, to express the sort of *syllogistic* reasoning which follows the drawing of analogies. The Rabbis ask: once a term A is seen as analogous to a term B (*gezerah shavah*), can the laws applicable to A be applied to B and/or vice-versa? Their answers by means of the 'freedom' concept may be understood as follows.

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184 The references given by Bergman for these three provisions are all post-Talmudic: *Halichos Olam* for the first two, and Rabbeinu Tam and Tosafot for the third.

185 Or, to be more explicit: pretensions, lies - made in support of a certain ideology, that of unchanging oral law. Note well the basis of my accusation: precisely in the attempt to buttress their concept of the fullness and continuity of tradition, these people are forced to acknowledge the occurrence, in the case under consideration, of incomplete transmission of information, and thus imply a loss of data in the interim and the unreliability of the transfer. The proposed formulae are therefore inconsistent with their own motive, and therefore must be inventions.

186 *Enc. Jud.* , p. 368, refers us to *Shab.* 64a and *J.T. Yoma* 8:3, 45a. *Enc. Jud.* explains the development of the idea of "free" (*mufneh*) terms, as a way to prevent abuses of *gezerah shavah* in the schools; it adds that this is a R. Ishmael requirement, which R. Akiba apparently disagreed with.

187 Not to be confused with the principle of R. Akiba that in the Torah no word is superfluous and no word-placement is accidental.

If both terms are 'free', it means that they were never before used in syllogistic inferences, presumably because they are both *sui generis*; consequently, the Rabbis assume them to be mutual implicants, and allow syllogism hither and thither between them. If only one is 'free', the Rabbis presume it to be a genus or species (I am not sure which) of the other, and thus allow syllogistic inference of laws from the genus to the species, though not vice-versa. If neither is 'free', it means that they have already led separate logical lives, so the Rabbis presume that the terms are unconnected (or at least that neither implies the other), and so avoid syllogistic inference.

This perspective explains the Rabbis' concept, but does not fully justify it. For the basis of their syllogistic reasoning is too imprecise; they do not have a clear picture (even though this theory arose long after Aristotle) of the conditions of syllogistic inference. Similarity between terms and the histories of the use of such terms in inferences do not indubitably determine the implicational relations between these terms. The Rabbis lacked a clear understanding of opposition theory, as we shall see also in the section dealing with harmonization.

✡ We may, in my opinion, place under one heading, namely **inference from context**, the exegetic methods known as ***meinyano*** and ***misofo*** (**Rule No. 12**) and those known as ***heqesh*** and ***semukhim*** (regarded as part of **Rule No. 2**). All these take into account the textual closeness of an expression or sentence to certain other(s), and on this basis assume that there exists a conceptual relation between the passages under scrutiny, which makes possible an inference of certain attributes from the context to the expression or sentence. There is, we might remark, a small element of inference by analogy in such processes[188], though it might be characterized as extrinsic rather than intrinsic. The differences between these four techniques are, however, less clear (to me, at least).

An example of contextual inference: the Rabbis inferred (by the rule *meinyano*) that the commandment "thou shalt not steal" in the Decalogue (Exod. 20:13), refers to kidnapping, on the grounds that the two preceding commandments, against murder and adultery, are both capital offenses, and kidnapping is the only form of stealing subject to the same penalty (*Enc. Jud.*, which refers to *Mekh., Ba-Hodesh*, 8,5).

Meinyano seems to loosely appeal to the surrounding subject-matter without precise definition of its textual position relative to the passage at hand. *Misofo* refers to a later clause or passage for the information it infers; though as some commentators have pointed out, it could equally well refer to an earlier segment of text. In these two cases, the conceptual common ground of source and target text is to some extent evident. In the case of *heqesh* and *semukhim*, however, the inference is based almost purely on textual contiguity, the contiguous passages (within the same verse or in two adjacent verses, respectively) having little evident conceptual relation[189].

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188 Note, however, that in some cases, traditionally classed as *heqesh* (see Abitbol, pp. 100-104), Scripture itself explicitly establishes the parity between the two areas of law. For instance, Deut. 22:26, which compares rape and murder, saying "for as when... even so..." (*ki kaasher... ken hadavar hazeh.*). In such cases, an inference is much more certain, though it may well have some limits, because it is analogical rather than contextual.

189 *Heqesh* and *semukhim* are classified by commentators with *gezerah shavah*; but I am not sure why (except for analogies given explicitly in the text) - they are not really subcategories of it, being based on neither homonymy nor synonymy, but on textual proximity. Perhaps it is because they often involve elements of *gezerah shavah*, that they were rather grouped with it. Also note, the distinction between them is ambiguous: in text originally devoid of punctuation, like the Torah, how to tell the difference between the two parts of the same verse or two touching verses? It only becomes meaningful once the subdivisions of the text are established.

The natural justification of logistical inferences would be what we today refer to as 'association of ideas'. When two ideas are placed next to each other in our thoughts, speeches or writings, it may be because of some logical relation between them, or entirely by accident, or again because one contains some incidental reminder of the other. This last possibility implies that in some cases, even when purely logical considerations are lacking, an inference might yet be drawn from the fact of proximity. However, the possibility of chance conjunction still remains: topic X may be entirely spent and the narrative moves on to topic Y, an entirely separate topic[190]. This alternative possibility means that inference based solely on position is tenuous. The Rabbis were apparently aware of this uncertainty, and would use such processes only as a last resort, when the verse being interpreted involved a doubt which they had no other way to resolve.

> R. Ishmael did not mention the exegetic methods of *heqesh* and *semukhim*, and attempts by later authorities to explain this silence have a hollow ring. Thus, Bergman (with reference to the *Sefer Hakerisus*) says of R. Ishmael that "he regarded the *hekesh* as the equivalent of an explicitly written teaching". If R. Ishmael did not even mention the subject, how can the later Rabbis know by tradition *why* he did not mention it. How can they have information on *his thoughts* on an unspoken issue? The very notion is self-contradictory: proving again that the authorities often confuse their personal *assumption* concerning some matter with a 'received tradition' (refusing to admit that R. Ishmael might not have known about these things, or that there might be no tradition concerning them, and that such issues must be resolved adductively).[191]
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> Again, R. Ishmael, apparently (and as the name given to the process implies), did not regard or was not aware that *misofo* inference was equally feasible in the opposite direction ('*mitechilato*', if we

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Looking further into the issue, I found some interesting remarks in *J.E.* Apparently, *gezerah shavah* initially referred to "analogies in either word or fact", but eventually was restricted to verbal analogies (homonymies), while *heqesh* became used for factual analogies (synonymies). If that is true, my presentation of these terms, based rather on Bergman's account, is inaccurate (terminologically, though not in essence). With regard to *semukhim*, it is attributed by *J.E.* to R. Akiba, quoting him as saying "every passage which stands close to another must be explained and interpreted with reference to its neighbor" (with reference to *Sifre* Num. 131); it adds that 'according to Ishmael, on the contrary, nothing may be inferred from the position of the individual sections'. In view of this, *semukhim* cannot strictly-speaking be counted as implicitly included in the 13 Midot of R. Ishmael.

190 A case in point seems to be the above given example (Exod. 20:13): supposedly the next two commandments (against bearing false witness and coveting) are not subject to death penalty; in that case, why should stealing (or kidnapping) be a capital offense? Of course, if a proposition is surrounded on *both* sides by a certain subject-matter, it becomes more likely that the common subject-matter of the two adjacent propositions somehow concerns the boxed-in proposition. Nevertheless, the possibility of *accidens* remains; there may well be significant underlying differences, which can be pointed to. An example is Exod. 21:15-17, where a law concerning kidnapping is found between two laws concerning striking and cursing parents, respectively. (Note that, as an acquaintance of mine, Dr. M. Izbicki, has pointed out, the laws on striking of parents and kidnapping both concern violent acts. Also, see Cohen, p. 474; the law assigns a penalty of strangulation for these two, but stoning for cursing parents).

191 Regarding *heqesh* and *semukhim*, Bergman adds additional details, which we will not comment on, here, to avoid repetitions. I want only to point out that the *semukhim* inference he gives as an example at the end of the section is very odd: from (Deut. 22:11) the proximity of the *prohibition* of 'shatnez' and the prescription of 'tzitzit', the conclusion is drawn that shatnez is *allowed* in the case of the tallit! This is far from normal inference, since the conclusion is an exception to one of the premises, although there was no inconsistency between the premises. Formally, the argument runs as follows: 'You mustn't do X. You must do Y. Therefore, when you do Y, you may do X'. Since the conclusion formally implies 'you may do X' it is contradictory to the major premise; such argument thus depends on an anti-literal particularization of the major premise.

may say so), from an earlier to a later statement or clause. Later commentators (Bergman refers to *Middos Aharon*), who considered such reverse inference possible, explain R. Ishmael's silence by claiming, effectively, that in cases where the solution precedes the problem, the inference is so obvious that listing it would have been a redundancy. That is another anachronistic argument, whether we agree with the validity of such inference in both directions or not. The commentators must admit the possibility that R. Ishmael did not hold the same opinion, or more likely still (since he himself does not mention it) that he just did not think of the issue at all!

✡ Inferences of the ***binyan av*** type (**Rule No. 3**) seem to be a Rabbinical attempt at **causal inference** - using the term 'causal' in its widest sense, including any mode of causality; i.e. not only natural-mode causation, of motion or change, but also extensional causality, of 'static' (i.e. class) differences, as well as logical causality, or rational explanation[192]. Causal inference has been much clarified in more recent times by John Stuart Mill[193], who identified the 'methods of agreement and difference'. It results from observation of two kinds of events or things, such that the presence of one is always accompanied by the presence of the other, and therefore that the absence of the latter is always accompanied by the absence of the former. In such circumstance, one may, from observation of the first event or thing, presume the second even when it is not observable. This is an inductive process, involving analogy and generalization. Symbolically, broadly-speaking, the essential relation between a cause C and an effect E may be expressed by a hypothetical proposition and its contraposite:

If C, then E (and if not E, then not C).

However, the Rabbinical attempts at formulation of this natural principle stressed more the side of 'agreement' than that of 'difference'. R. Ishmael refers to an inference 'from one verse' or 'from two verses'. There were subsequently disputes as to the meaning of these subdivisions (which disputes, incidentally again tend to show the lack of a clear oral tradition). Some Rabbis understood them, respectively, as follows: if two topics (X, Y) have a certain feature (A) in common, then *another* feature (B) which the one (X) has may be assumed to be

192 Our identification of *binyan av* with causal arguments may be too narrow; some examples in the literature seem like mere extrapolations with nary an underlying cause and effect thought-process (though we might construct one, ex post facto). An example given by Scherman illustrates this: Just as one may neither marry one's sister from the same two parents, nor one's father's full sister; then, since one may not marry one's sister from the same mother but different father, 'it follows that' one may not marry one's father's maternal half-sister (ref. to *Yevamos*, 54b). Scherman says *binyan av* is also known as *mah matsinu?* ("what have we found?"), though Bergman informs us that these two were counted separately in Hillel's list. I suspect the Rabbis at first engaged in generalizations with little reflection, and then gradually found it necessary to clarify conditions.

193 English logician (1806-1873), author of *A System of Logic* (1847). Mill's formulation of these methods is more complicated than the one proposed here: 'agreement' is observed constant conjunction of two phenomena, 'difference' is the constant conjunction of their negations; thus, the formal relationship is mutual, i.e. the same in both directions: this is the strongest form of causality, in which the cause is not only sufficient for the effect, but necessary or a *sine qua non* for it. Note that, in all such definitions (as Mill was aware), cause and effect are difficult to distinguish: to do so, we must look at their temporal or conceptual sequence. Note also that Mill suggested other important methods, namely 'residues' (elimination of alternatives) and 'concomitant variations' (see Appendix 1, section 3).

had by the second (Y)[194]; or, if three topics (X, Y, Z) have a certain feature (A) in common, then *another* feature (B) which two of them (X, Y) have may be assumed to be had by the third (Z). Other Rabbis claimed to understand R. Ishmael's formula differently[195]. They sought for a common feature[196] (A, say) of topics under comparison (X, Y) which would *explain* their having in common some other property (B), in which case the reappearance of that same feature (A) *elsewhere* (in Z) could be taken as a sign of the same property (B) there (i.e. in Z). In fact, this formula is *formally* identical to the second of the above mentioned[197], merely adding the (valuable) comment that A is to be considered as the cause of B.

The difficulty in these statements is their emphasis on the positive, their attempt to generalize from a limited sample (X, or X and Y) without readiness to conceive the possibility of deviation from the apparently set pattern of conjunction (of A and B) in other cases, including, in particular, the case at hand (Y, or Z, respectively)[198]. Apparently sensing this weakness, the Rabbis tried to put a bit more emphasis on the negative, by pointing out differences in features between the (two or three) topics under scrutiny, thereby hoping to demonstrate other possible causes have been considered and eliminated. Thus, they might say, in the two-verse form of *binyan av*: X has C and Y lacks C, so that Z having C does not prove it has B; or again, X lacks D and Y has D, so that Z having D does not prove it has B. However, it should be clear that such statements are irrelevant to the main argument: they at best prove only that C or D *do not* cause B, but do not prove that A *does* cause B[199].

> An example of *binyan av*, given in *Enc. Jud.* (referring to *B.M.* 87b). The Rabbis attempt, with reference Deut. 23:25f., to determine whether a hired farm hand may eat produce, while working in fields other than those with vines or standing corn. To do so, they try to understand why the Torah allows him to eat in vineyards and in cornfields. They argue: it cannot be in relation to the obligation to leave gleanings for the poor (Lev. 19:10), since this applies to vine but not corn; and it cannot be in relation to the obligation to give the priest a portion of the dough (Num. 15:17-21), since this applies to corn but not vine; 'therefore,' it must be simply due to their being both plants, and the permission may be generalized to other produce.[200]

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194 This approach is known as *Chada mechada* (Aram., 'one from one'). If the one-verse variant is so called, then the two-verse variant may presumably be called 'one from two' (but I do not know what it was actually called).

195 According to Bergman, this second school claimed the one-from-one inferences obvious and not needing to be included in the 13 *Midot*. How they viewed the 'one from two' formula, he does not say.

196 Heb. *tsad hashaveh*.

197 Added proof of which is the lack of distinction, in the 'common feature' approach, between one-verse and two-verse inference in accordance with R. Ishmael's formula. That is, if in this approach 'one-verse' means 'one from two', then what might 'two-verses' mean?

198 Logicians refer to the underlying logical fallacy as *post hoc ergo propter hoc* (i.e. 'after this, therefore because of this').

199 Unless, of course, it is already proven that A, C, D are the only alternative possible causes of B; so that the inference consists in elimination of two out of three possibilities. But that is not everywhere the case.

200 The logical naivety of such argument should be obvious. Say a boss calls three of his employees to his office (intending, say, to congratulate the first for his new-born son, give a raise to the second, and fire the third). No one knows the boss's reasons, but the third employee tries to guess why he has been invited, by looking for a 'common factor' in the two others. He says: "it cannot have to do with hair colour for the first is blond and the second is a brunette; it cannot have to do with honesty, because the first is dishonest and the second is honest; it must therefore have to do with nose shape,

It appears from such redundancies that the Rabbis confused somewhat the trial and error mental process of *looking for* a cause (*ratio cognoscendi*), and the formal conditions of the objective causal relationship (*ratio essendi*). Had they known the latter clearly, they would rather have systematically first made sure they had a *complete enumeration* of the appearances of features A and B in the Torah, alone and/or separately, as well as their negations if any. Then, to make possible the inference from A to B, in situations where A is mentioned in the text but B is not mentioned, they would have to check, not only that A and B are sometimes both affirmed together (at least once, but the more the better), but also that A is never affirmed with an explicit *denial* of B (that is the missing negative element). Furthermore, the *probability-rating* of the inference would be proportional to the frequency of conjunction of A and B, compared to that of A mentioned alone without mention of B[201]. It is possible that in the cases where the Rabbis applied this principle, they (who knew the Torah by heart) automatically performed these consistency tests and probability judgments; but they did not always do so explicitly.

> It must be stated that aetiology does not insist that the cause be one event or thing, or that the effect be one event or thing; each of these (cause or effect) may itself be two or more **parallel** things or events, provided the stated rules of induction (agreement and difference) are adhered to for them all singly. Furthermore, if the rules of induction are not invariably adhered to (whether by a single event or thing or many of them), they might still be found to apply **conditionally** or **compositely**: that is, provided we manage to identify and distinguish the conditions under which our partial causes become complete causes or our occasional effects become constant effects[202]. Consequently, too, there may be circumstances in which one event or thing is the cause of a certain effect and other circumstances in which another is so; or again, a certain event or thing has some effect in one set of circumstances, and another effect in another set.
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> These details of causal logic were apparently not entirely understood by the Rabbis, judging from certain limiting suggestions they made. One such Rabbinic limitation was that (with reference to the symbols introduced above)[203] if X and Y have in common yet another feature (E, say) which Z lacks, then Z cannot be assumed to have B. *I say*, viewing 'A+E' as a joint feature, this objection seems reasonable; but it still remains possible that A causes B. Another Rabbinic limitation was the rejection of the possibility that distinct features of X and Y, such as C and D (see above), may independently cause B in their respective subjects, so that Z, which has only the common feature A, but neither of the distinct features C, D, may not have B. *I say*, it is conceivable that the two compounds 'A+C+nonD' and 'A+nonC+D' might be parallel causes, while the compound 'A+nonC+nonD' is not a cause: the issue

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because both, and indeed I too, have the same nose shape." His whole argument is utterly fallacious and beside the point!

201 For it always remains conceivable that *non-mention* of B in certain passages signifies *negation* of B, even though there are no known cases of presence of A with absence of B, which fact inductively allows us (indeed, obligates us) to generalize and say that A implies B.

202 Conditional/partial causes, considered together with their conditions or allied parts (i.e. collectively), constitute unconditional/complete causes. Occasional effects, in loosely defined surrounding circumstances, become constant effects, when the significant circumstances are more precisely pin-pointed. All such variations on the theme of causality are obvious to anyone who has studied hypothetical logic, considering multiples and compounds of antecedents and consequents, and nesting; it is no great secret (at least nowadays).

203 Where X, Y, Z have in common A, and X, Y have in common B; and they would conclude that Z has B, also.

depends on the negative side, which they ignored in their initial definition[204]. Such attempts at exception show, to repeat, that the Rabbis were not certain as to the precise conditions of causality[205].

There is a manifest failure of theoretical research in logic, independent of any Torah related doctrines, by the Rabbinic authorities. Consequently, as may be expected, there is a lot of controversy between them on methodological issues (which, of course, ultimately affect the law); and worse still, sometimes the controversy revolves around a totally artificial issue (which naturally enough emerges from some general belief to which the disputants are all attached). What amazes me is that the existence of such controversies does not cause any of the people involved to frankly question the 'orthodox' doctrine that the hermeneutic principles, in their entirety, are Sinaitic revelations.

A case in point is the discussion concerning the 'two verses coming as one' principle, according to which if a law L is stated in relation to two subjects, S1 and S2, and logically L(S1) implies L(S2), and/or vice-versa, so that one of the statements is redundant, then L may *only* be applied to the two situations specified. This principle has no natural basis, as far as I can see; i.e. it does not formally follow that L(S1) and/or L(S2) *cannot* logically imply some other, unstated application, say L(S3). If such implication does logically occur, it cannot be inhibited by Divine or Rabbinical fiat (God does not contradict His own natural laws, nor allow them to be by-passed by humans) [206]; for this reason, the restriction must be classed as artificial. Analytically, it seems to be merely an outcome of R. Akiba's claim that there is no superfluous statement in the Torah; which idea is itself controversial, since R. Ishmael (theoretically) rejects it, claiming that the Torah speaks in the language of men. Whatever its source, there is controversy concerning the precise formulation of the proposed principle, from Mishnah onward. Some authorities (among them Tosafot) claim that at least two redundancies are required for such restriction. Some (among them Rashi) say that the restriction is in any case not general to all inference, but limited to attempts to extend the law concerned by means of *binyan av* inference. But I see no formal basis for these subjacent disputes, either.

The deep intellectual cause of such deviations from natural logic is, in my opinion, initially a naive *non-formalism*, gradually developing into a systematic *anti-formalism* (which is also naive, in other respects). The historical cause is an unfortunate, at first emotional and later ideological, antipathy to what they called 'Greek knowledge', which blocked any attempt to learn from the discoveries of others. For these people, *logic* has to adapt to the requirements of pre-conceived contents (the Halakhah), rather than all contents yielding to the dictates of an objective, formal logic. This Rabbinic claim of total control is evident, for instance, in Bergman's statement in this context: "The rules regarding Scriptural texts... reveal a law only in relation to the place they are applied and not elsewhere".

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204 It does not surprise me, therefore, that, according to Bergman, 'the *Gemara* does occasionally raise such a refutation'. He adds that 'the commentators (to *Kesubos* 32a) have formulated principles to explain these exceptions'; I have not seen these principles, but we must keep in mind that they are ex post facto rationalizations, since natural logic allows alternative causes.

205 Another issue they raise is whether the exceptions have to be 'significant' or not - claiming that refutation of a 'one from one' *binyan av* requires a legal exception ('stringency or leniency'), whereas against a 'one from two' *binyan av,* any exception (legal or non-legal) will do. I can only say that such a distinction is not made by natural logic.

206 I refer here, of course, to deductive logic; if the 'implication' is merely inductive, i.e. not *necessary* but only *recommended as probable*, it might conceivably be preempted with reference to wider considerations.

The doctrine of the Sinaitic origin of Rabbinic hermeneutics is not primary, but a derivative of the doctrine of the Sinaitic origin of Rabbinic law. The Rabbis thought they could manipulate logic however they saw fit, so long as they arrived at the required legal results. Controversies occurred only in relation to the necessity or efficacy of this or that manipulation, but not in relation to the underlying epistemological assumption.

These reflections need not be taken radically. Our concern, here, is with Judaic logic as such, not with Jewish law. If we throw doubt on the former, it does not necessarily follow that all, or any, of the latter is wrong; for, as logic teaches, denial of the antecedent (in this case, some aspects of Rabbinic hermeneutics), does not imply denial of the consequent (in this case, Rabbinic law) - *unless* their relationship happens to be exclusive. A law may be correct (i.e. truly Divinely-willed), but improperly derived from the text (i.e. from the wrong place or in the wrong manner). A law may, of course, alternatively, be incorrect, as well as improperly derived. These are not matters which can be dealt with in general ways; but each case must be reviewed carefully, after which the consistency of the whole must also be verified. In any case, logic cannot itself be made an issue of faith, something optional.

A statistical note. I have not so far found out just how many times each form of exegesis described here is actually used in the Talmud and other Rabbinic literature. For the moment, here is some information gleaned from the Index Volume of the Soncino edition (1952) of the Babylonian Talmud. As we saw in an earlier chapter, this index contains some 137 references to *qal vachomer* argument (under various headings). With regard to various forms of argument by analogy, there are some 161 references (analogy, deduction by, 58; comparisons, for purpose of deriving laws, 1; *gezerah shawah*, 81; *hekkesh*, 17; *semukin*, 1; texts, proximity of, 2; textual reading, 1). Whether this index is complete, and whether each reference concerns a distinct sample or there are repetitions, and whether some references relate merely to theoretical discussions, I cannot venture to say[207].

Note also that we must distinguish between use of an argument: (i) *within* the Bible itself (e.g. we know of four or five cases of *qal vachomer* in the Torah, and two dozen more in the rest of the Bible); (ii) *by* the Rabbis, especially those of the Talmud, in their efforts of exegesis *from* the Bible, as a document, of Halakhic or Hagadic material; and (iii) *by* the Rabbis, especially post-Talmudic ones, in relation to the non-exegetic pronouncements *of* other Rabbis. Clearly, the statistical question constitutes a large and difficult research project in itself.

3. Scope of Terms.

Obviously, in the reading of any text, understanding the terms used is of the essence. This has two aspects: a *qualitative* aspect, which by its very nature presupposes knowledge of the language involved, and a *quantitative* aspect, which relates to determinations of scope. Rabbinic tradition has, of course, had much to say about both these aspects. The first aspect,

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207 See also, possibly, the items: exegetical principles, 2 references; rules by which law is expounded, 2; texts, exposition of, 3; texts, implication of, 1.

elucidation of the denotations and connotations of terms, is in part dealt with within the hermeneutic principles, by way of inferences by analogy and context; and in part, it depends on cultural and religious tradition and the insights of commentators. The second aspect, concerning subsumptive issues, is covered by a set of hermeneutic principles which we shall now consider.

✡ The methods of exegesis known as collectively *klalim uphratim*[208], are efforts to interpret the effective subsumption of logically overlapping terms found in the Torah (and thence applicability of the proposition(s) involving those terms). ***Miklal uphrat*** (**Rule No. 4**) is the interpretation of a genus + species combination, in that sequence, as having a limiting effect, signifying 'only the species mentioned' (the species is mentioned for purposes of excluding others of the same genus); whereas ***miprat ukhlal*** (**Rule No. 5**) is the interpretation of a species + genus combination, in that sequence, as having an enlarging effect, signifying 'the species mentioned and others like it' (the species is mentioned as a sample of those in the genus). An easy way to remember these two rules is to say that the result is equal to the second of the two given terms. Other such rules, as we shall see, have an overall limiting result.

> To put us into the picture let us note that, in everyday discourse, we would (depending on the precise wording) understand the conjugate scope of logically overlapping terms as follows, granting that G is an overclass and S1, S2... one or more of its subclasses, and that G and G' are two classes which partly intersect without either subsuming all of the other's instances and S, say, is the entire subclass referring to the G' part of G. A statement whose subject is "GS" or "SG" would be interpreted minimally as concerning the species "S"[209], though in some cases the genus "G" might be appropriate. "G *such as* S1, S2..." might be read as "S1, S2..." (if 'such as' is taken to mean 'similar to') or as "G" (if 'such as' is taken to mean 'for examples'). A listing of the form "S1, S2... *indeed* G" would likely be intended as "G", though without a qualifier like 'indeed', a doubt might subsist. Lastly, "GG'" or "G'G" is usually intended as "G and G'" (i.e. "S", their common ground), though occasionally might mean "G or G'" (including both their grounds, as well as "S" or even possibly to the exclusion of "S").
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> There is evidently much vagueness in ordinary language, which logical science can easily overcome by instituting conventions. This field of inquiry is not class logic proper, but a linguistic preliminary to it. Note that a mental act of 'reconciliation of conflicts' is involved, insofar as the terms dealt with are in some tension, according as we understand reference to a genus as concerning the whole of it (*davqa*) or most or an unspecified portion of it (*lav davqa*), and reference to a species as concerning it at least (*lav davqa*) or it exclusively (*davqa*). When the terms are mentioned together as subjects of propositions, there is therefore doubt as to whether the result is a generality, a contingency or an indefinite particularity. The logical rule, in case of doubt, is to acknowledge, by dilemmatic argument, the indefinite particularity (*at least* some) as true; deductively, we remain open-minded as to whether the generality (all) or contingency (some, but not all) is true; inductively, we opt for the generality, because it introduces no new polarity, unless or until conflicting evidence is found.

For the Rabbis, in the *klal uphrat* case, the genus is mentioned as a first approximation of the meaning intended, and the species is added to more precisely pin-point that meaning. For instance, in Lev. 1:2, "of the livestock (*behemah*), of the herd and of the flock," the general term is one of variable connotation (it could be taken to include other types of animal,

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208 This phrase is wrongly translated by Bergman as "generalizations and specifications"; we would prefer "generalities and particularities" or "genera and species". Strictly speaking, the term generalization, in English, refers to a mental process moving from a particular statement to a general one, and specification refers to a movement from a vague statement to a more precise one. Here, however, the issue is finding out how wide or narrow was the intent of the writer of the text.

209 Note, however, that in English an adjective usually precedes a noun, while in Hebrew if follows it.

such as asses perhaps) and is clarified by means of the mentioned species. To explain why the species were not simply mentioned alone, without the genus, we are told that *extensions* unintended by the writer might then have been proposed, or alternatively that certain details suggested by the genus might have been missed; opinions differ among the authorities on this point. We could accept an amalgam of both as reasonable: the genus is there, effectively, to say "but do not include with these species, other *dissimilar* species of the same genus".[210]

In the *prat ukhlal* case, some species are first listed to indicate the kind of thing intended, and the genus is added in conclusion to indicate "and other things of the same kind" to be also intended. For example, in Exod. 22:9, "an ass or an ox or a sheep, or any beast (*behemah*)," the species exemplify the things intended and the genus serves to extend the application of the law concerned to other similar things, implying the initial list not to be exhaustive. To explain why the genus was not simply mentioned alone, without the species, we are told that *exceptions* unintended by the writer might then have been proposed, or alternatively that certain details suggested by the species might have been missed; opinions differ among the authorities on this point. We could again accept an amalgam of both as reasonable: the species are there, effectively, to say "and be sure not to exclude from this genus, other *similar* species of the same genus".

> These methods, and other variations (mentioned below), are R. Ishmael's; R. Akiba proposed others in the same contexts: he determined the scope of statements with reference to the principles of ***ribui umiut*** and ***miut uribui*** (amplification and limitation, and vice-versa). The technical difference between these approaches is essentially one of emphasis. Whereas in *klal uphrat*, the mention of species serves to more precisely define the initial genus; in *ribui umiut*, the explicit mention of species stresses the exclusion of certain dissimilar things, not explicitly mentioned, belonging to the initial genus. And whereas in *prat ukhlal*, the final genus serves to more broadly define the full extent of the list of species, adding to those explicitly mentioned more species not explicitly mentioned, while also incidentally somewhat limiting, as all definitions do, excessive extrapolations; in *miut uribui*, the mention of the genus stresses the limits of extrapolation more, excluding certain unmentioned species of it too extremely dissimilar to the mentioned species, while also incidentally suggesting certain unmentioned species to be included[211].

These forms of interpretation seem to me natural enough in themselves. In many cases, the wording is clear and no discussion is possible, anyway. However, in some cases, the results do not seem formally inevitable: one might sometimes view genus+species as signifying 'genus, *of which* a sample species is...'[212], and species+genus as signifying 'species,

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210 A way to explain the mention of the overclass is to regard it as intended to *allude* to its instances or subclasses not included in (or alluded to by) the mentioned subclass; which are to be the subject of an unstated proposition of opposite polarity, which makes the stated particular a contingent.

211 Albeit the theoretical formal convergence between these approaches, they in practice often led to divergent material conclusions (with R. Akiba's often ending up as Halakhah). I would need more specific knowledge of the Talmudic debates concerned to be able to explain why. But, assuming I have correctly understood the formalities and basing myself on the few cases I have studied, I would say that such differences simply go to show the amount of subjectivity involved in the 'inferences', in practice.

212 e.g. 'logical arguments, syllogism, adductions, are means to knowledge' does not restrict the genus to the listed species. One might construct a sentence in this way, if one thought some auditors unable to grasp the generic subject's name without apposition of some more familiar species names.

of which the relevant genus is...'[213]; in such cases, note, the term mentioned in second place is effectively in brackets, suggesting a proposition which communicates, in passing, some incidental information (not necessarily of immediate legal relevance). Consequently, if we take the rules as *ex cathedra* pronouncements, and attempt to always tailor our interpretations to fit their given formats, we are not unlikely to be occasionally misled. Clearly, behind such regulations is the rigid mode of thought which denies stylistic license to a document of Divine origin[214]

✡ With regard to the other combinations and permutations of these inferences of scope (classed as **Rule No. 6**), notably ***klal uphrat ukhlal*** and (apparently a later addition[215]) *prat ukhlal uphrat*, we need only add the following comments. These involve successive operation of the preceding two principles, with the *klal* stages having a broadening effect, and the *prat* stages a narrowing effect, the overall result being relatively narrow[216]. There is a proportionately greater opportunity to force the text into preconceived formats, rather than interpreting it naturally. It seems to me that we should always try to grasp the simple reading (*pshat*), and avoid deviation from it without overwhelming justification.

> An example: Num. 6:3-4 forbids the Nazirite from drinking wine or strong drink or their vinegars or liquor of grapes, or eating fresh or dried grapes or anything made from the grapevine, from the kernels (*chartsanim*) to the husks (*zag*)[217]. According to Bergman, *Nazir* 34b reads this passage as *prat ukhlal uphrat*, but this seems to me unjustifiable, if 'strong drink' (*shekhar*, which can make one drunk) refers to alcoholic beverages other than wine and such. For in that case, 'wine and strong drink' cannot be wholly regarded as a *prat* in relation to 'products of the vine', which is a *klal* at best only in relation to wine and other grape-based drinks, fresh or dried grapes, and kernels and husks. The way all these items are listed is natural enough, in three classes grouping together alcoholic drinks (not all grape-based), normally eaten forms of grape, and parts normally wasted by the consumer, respectively, and additionally mentioning a wider class which most (*but not all*) of the items fall under. To insist on fitting them into the format *prat ukhlal uphrat* is artificial and inaccurate.[218]

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213 e.g. 'Aristotle's syllogism, a deductive argument, yields categorical conclusions' does not intend the genus as a whole but only the species. The genus, here, serves only to place the specific subject in a larger context.

214 It is interesting to note that the rationalistic philosophy, trying to explain every word and word placement in a certain preconceived manner, which is assigned to R. Akiba, is here, and in other instances, really at the basis of R. Ishmael's inferences, as well as R. Akiba's.

215 It is noteworthy that R. Ishmael mentioned only the first of these as one of his rules, ignoring the second and also *klal-klal-prat* and *prat-prat-klal*. My explanation of such repeated gaps in R. Ishmael's list is simple: as often in the early stages of an investigation, thinkers do not initially work out an exhaustive analysis of the topic concerned with reference to *symmetries*, but rather concentrate on cases which happen to arise before them in the context of their less abstract concerns. It is only later that they, or their successors, look into other possible combinations and permutations suggested by reshuffling the terms at hand. R. Ishmael did not get around to that systematizing stage; his successors did. (All well and good; what is annoying is their attempts to justify their results by imputing them anachronistically to him.)

216 A technical distinction suggested by the Rabbis between the two stated principles is that, quoting Bergman, the first "dictates that every item which bears even one similarity to the specification is included," whereas in the second "the item to be included must resemble the specification in at least two aspects." He adds: "How significant the resemblance had to be was left for the Sages to determine. Occasionally, they considered several aspects as one." Here again, I must say, I see no natural basis for these added details.

217 These words are variously understood by the Rabbis.

218 Another kind of example is Num. 18:16, which according to Bergman is interpreted in *Shevuot* 4b as *klal ukhlal uphrat*. Here, the forcing consists in reading a subject, predicate and qualification of

✡ We should also mention here the principles ***miklal hatsarikh liphrat*** and ***miprat hatsarikh likhlal*** (general term requiring a particular [complement], and particular term requiring a general [complement]), which R. Ishmael's list groups together as one (**Rule No. 7**)[219]. We may classify these, as Bergman does (presumably following previous authorities), with the *klalim uphratim*. The distinction between them is, he suggests, effectively: whereas *klal uphrat* and *prat ukhlal* and their ilk concern the collective effect of separately clear terms, the *hatsarikh* rules relate to vague terms whose precise meaning is only clarified by their mutual impact on each other. This distinction is very fine indeed, and rather forced judging by the examples given in the literature[220].

> I would say, rather, that a case could be made for distinguishing between functionally independent terms (broadly speaking, classes of entities, which may however have a hierarchical relation; e.g., 'animals' and 'bulls') and dependent terms (more precisely, a relatively independent term, like 'bulls', and its complementary clauses; e.g. 'the horns *of*' or 'the goring of people *by*'). The relation between independents is at best simply subsumptive (bulls are animals), whereas the relation between dependents is a more complex one, like possession or action (bulls have horns and bulls gore people)[221]. The former *supplement* each other, the latter *complement* each other. I do not mean to say that the Rabbis did classify their inferences under this or that heading on the basis of the distinction I am proposing (though perhaps they were trying to), but rather that if they insisted on making some kind of subdivision of the phenomena at hand, they might relatively usefully have selected it instead of the above mentioned[222]. I say 'insisted', because my distinction too is not radical enough to justify the formulation of additional hermeneutic rules. For one can usually (and much formal logic is based on this operation), perform what is known to logicians as a 'permutation'[223], and change the complementary term into an independent one (bulls are 'horn-having things' and bulls are 'goring things').

A note on statistics. The Soncino general index has 77 references to the topic of *klalim uphratim* (supposedly, but I did not check). These come under various headings: amplification, 5; amplification and limitation, 15; amplification following amplification, 2; extension in exegesis, 5; general principles and exceptions, 1; general rulings, 2; generalisation, 2; generalisation and specification, 28; limitation in exegesis, 6; rule, general and particular, 1;

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predicate as classes (broad, broader and narrower), ignoring entirely their relative positions (logical roles) in the sentence.

219 Why he should do so, when he separated *klal uphrat* and *prat ukhlal*, is a mystery to me; or alternatively, why were not the latter two and their multiples grouped together, similarly? I would suggest, here again, a failure to stand back from accumulated knowledge and re-order and systematize the results obtained.

220 For instance, the example from Lev. 1:2 given earlier would, according to Bergman's definitions, constitute a *klal hatsarikh liphrat* rather than a *klal uphrat*, as well as I can tell. Note, however, that Bergman hints that 'there are many varying opinions' concerning the definition of *hatsarikh* processes; so we might reserve judgment.

221 This distinction is reminiscent of that which logicians make, between *categorematic* and *syncategorematic* terms, though not exactly identical. Note that, unlike independent terms, dependent terms are not conjoined by a mere 'and', but by more intricate relations like 'of', 'by', 'for', 'through'.

222 A Torah example might be Num 18:16: "according to your valuation, five silver shekels" (mentioned in an earlier note), where 'five silver shekels' makes no sense by itself, apart from the concept of 'valuation' (in this case, for redemption purposes).

223 It should be noted, however, that certain terms, which are colloquially put in a similar format (notably, 'capabilities of' and 'metamorphosis of') cannot be freely permuted without causing eventual contradictions. But such issues cannot be addressed in so narrow a context; they are fields of logic in themselves.

rule, extension and limitation, 1; *ribbui*, 1; *ribbui umiut*, 1; specification, 1; specification as exegetical rule, 2; specification and generalisation, 4. As before remarked (in the discussion of Talmudic a-fortiori), to what extent such a list is exhaustive and non-repetitive, is hard to say without further investigation. In any case, it does not tell us precisely how many times each rule is actually used.

11. THE THIRTEEN *MIDOT* (II).

In this second part of our analysis of the Thirteen Midot of R. Ishmael, we shall deal with Rules 8-11 and 13.

4. Harmonization.

Broadly put, the five remaining hermeneutic principles, which we shall label 'harmonization rules', serve to resolve apparent redundancies, discrepancies, doubts, tensions or inconsistencies between propositions. In some cases, their results are identical with those of formal logic; in some cases, they favour a course which is only a possibility among others according to formal logic; and in some cases, they suggest a course which formal logic would not have recommended. Note that these principles constitute units of thought-process, which may be operative individually in simple situations, or eventually successively in complex combinations.

> Note that my formal analysis in this section is based on a possibly limited sample, drawn from the derivative literature on the topic that I have consulted. The few examples which are there presented as representative of the Rabbinic tradition may not be fully representative of that tradition. Furthermore, even if these examples are fully representative, it remains possible, indeed likely, that direct and thorough empirical research into the Talmud and other Rabbinic literature would reveal a much larger variety of forms of thinking, legitimate or not, in actual use[224]. The observations of the Rabbis of the past 2,000 years interested in these matters, and their conceptualizations and classifications of what they noticed, need not be taken for granted. On the contrary, as we show here, their failure to use formal methods make it very probable that they missed some of the available data and misjudged the data they had. Much work can still be done, and it is hoped that my initial efforts will be pursued further by others.
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> It should be noted that none of the harmonization rules here dealt with are mentioned in the Soncino index[225]. So I have no inkling how often these rules are actually used in the Talmud.

Our interest here, note well, is not in the legal issues as such, but in the logical structure of the exegesis. I have no Halakhic ax to grind; my purpose is to institute a *methodology* for clarifying, classifying and evaluating Rabbinic exegesis, with reference both to its theoretical and practical aspects (that is, R. Ishmael's rules and their explanation by Rabbis, on the one hand, and examples of their application in Talmud and other Rabbinic

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224 A case in point was indicated in the previous chapter (footnote 15): the inference, from the prohibition of shatnez and the prescription of tzitzit, that shatnez is allowed in the case of the tallit. But also, previously and further on, we find many tacit inferences in Rabbinic thought, which though allied to explicited principles, are not themselves aspects of those principles.

225 Though possibly "text, superfluous", which has only one reference, applies.

literature, on the other hand). Our empirical data consists of traditional pronouncements and actions, but our analytic approach to this data will be strictly objective and scientific.

We shall now deal with the first three (actually, four) of the hermeneutic principles which begin with the phrase ***kol davar shehayah bikhlal veyatsa...*** (**Rules No. 8-10**), which means literally 'anything which was in a generality and came out...'[226]. Broadly put, in formal terms, these rules are concerned with the following exegetic situation:

Given:
All S1 are P1 (major premise),
and All S2 are P2 (minor premise),
where All S2 are S1, but not all S1 are S2, (subjectal premise)[227],
and P1 and P2 are in some relation *f*{P1, P2} (predicatal premise).

What are resulting relations:
between S1 and P1, and between S2 and P2, other than the above given;
and between S1 and P2, and between S2 and P1 (conclusions)**?**

This, then, concerns two subalternative subjects (S1 and S2, whose genus-species relation is defined in what we shall call the 'subjectal premise'), which are found in Scripture separately related to two distinct predicates (P1 and P2, whose relation is defined in what we shall call the 'predicatal premise') [228]. The given relation of the genus (S1, the major subject) to its predicate (P1, the major predicate) will be called the major premise; while that of the species (S2, minor subject) to its respective predicate (P2, the minor predicate) will be called the minor premise. The question asked is, what information can be inferred concerning the various subjects and predicates (conclusions)? *For us, this question is two-fold: (a) what conclusions does **Rabbinic tradition** propose, and (b) what conclusions does **pure logic** propose; comparing these sets, we might find them to coincide or intersect or entirely diverge.*

The major and minor premises are given explicitly in Scripture (presumably, though it is conceivable that they be only implicit, provided they are derived from the text *purely* deductively). The subjectal premise may be textually given (or, again, strictly implied), or, as often happens, it may simply be obvious (natural knowledge); likewise, for the predicatal premise. The form of the latter relation, *f*(P1, P2), varies from rule to rule, and of course will affect the conclusions drawn. One of P1 and P2 may be subordinate to the other, or they may imply each other (being identical, or logically implicant);

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226 Note that these rules differ from the *klalim uphratim* in that, rather than concerning the mutual impact of *terms*, they concern the mutual impact of *propositions*, estimated by careful scrutiny of the subjects and predicates they involve, as well as their various other formal features (polarity, quantity, modality, etc.).

227 Note carefully that it is the narrower subject S2 that implies the wider subject S1; for that reason, we say that S1 is subaltern to S2. On the other hand, since S1 includes S2, we say that S2 is subordinate to S1.

228 If two propositions have identical (or at least, logically implicant) subjects (both S, say), these rules do not apply. In such case, we are dealing with ordinary 'oppositional logic', so that the opposition of the propositions is in principle identical with the opposition of the predicates. However, if the quantity differs in the two premises, then it might be argued that their subjects are not technically equivalent, but merely subalternative (all S = S1 and some S = S2). Whether in the latter case the Rabbis would apply the rules in question, I do not know.

or P1 and P2 may be otherwise compatible (subcontrary or unconnected), or they may be incompatible (contradictory or contrary).

As for the 'conclusions' proposed, we shall see how they vary, and are generated, as we proceed; note that they may be inductive, as well as deductive. It should be remarked that in Rabbinic exegesis, one or more of the premises may be altered in the course of the argument: an initially general proposition may end up as contingent or as exclusive; such changes must be counted as 'conclusions' (or part of the overall 'conclusion'), too.

Needless to say, the Rabbis never formulated their rules in such formal terms; I have expressed them in this manner to clarify them and evaluate them with certainty. R. Ishmael's definitions (roughly, but passably) specify the major, minor and subjectal premises, as well as (though not always clearly) the putative 'conclusions', in ordinary language. But they do not specify, or do not more than hint at, the predicatal premises, which must be more or less guessed at, with reference to traditional examples; *our hypotheses in this regard are confirmed by the symmetry and exhaustiveness of the combinations they postulate*. As for logical evaluation, R. Ishmael and his contemporaries and successors do not make any effort at, or demonstrate any skill in, formal analysis of the processes; we will endeavor to fill the gap.

Furthermore, I very much doubt that these hermeneutic procedures were mechanically applied wherever their respective formal conditions were found; rather, I suspect, they were treated as a set of tools, which could be used, or ignored, as convenient, provided the Rabbis all approved. It is hard to imagine how they could proceed otherwise, because as we shall see the conclusions they draw are more often than not logically unnecessary (if not, in some contexts, illogical); whence it follows that inconsistencies are bound to arise in some cases, calling for a retreat from previous exegetic acts which caused the trouble. But to prove this prediction, one would have to study the Talmud in much more detail than I have done; ideally, one would need a well-ordered list of all the cases where exegesis took place.

Now, *by means of syllogism*, we can without further ado make the following inferences (side conclusions):

From the minor and subjectal premises, **Some S1 are P2** (mood **3/AAI**).
From the major and subjectal premises, **All S2 are P1** (mood **1/AAA**).

Yet other formal syllogisms may be possible, depending on the predicatal premise involved; such eventual inferences will be pointed out as we proceed.

In some cases, these various deductive inferences lead to no antinomy and are accepted by the Rabbis, though they may go beyond them and recommend some inductive process (for instance, an *a-contrario* reading or a generalization). In some cases, they lead to no antinomy, but are refused by the Rabbis (for reasons we shall see), who inhibit them in some way (for instance, by means of an anti-literal reading of the text or a particularization). In some cases, deductive logic from the given data results in a conflict, which must be resolved; and here again, the Rabbis may favour one reconciliation over another.

We have above considered, and will continue to do so, only the **copulative** forms of *kol davar shehayah bikhlal*; that is, forms involving *categorical* propositions. However, it should be clear that **implicational** forms of same are equally conceivable; that is, forms involving *conditional* propositions.

Both types are used in Rabbinic examples, though perhaps the former more so than the latter. As shown below, the overall format of implicationals is similar to that of copulatives; all results are presumably the same, *mutatis mutandis*. We need not, therefore, treat both types; nor will we do so, to avoid repetitions. The significant difference between them is that, while copulatives involve four *terms*, implicationals involve four *theses*. Instead of the subjects (S1, S2) and predicates (P1, P2), we are concerned with antecedents (P1, P2 - not to confuse with the preceding symbols for Predicates; here P stands for Proposition) and consequents (Q1, Q2), respectively. Thus, for the record, we have, broadly put:

Given: If P1 then Q1 and If P2 then Q2 (major and minor premises)**,**
where P2 implies P1, but P1 does not imply P2 (antecedental premise)**,**
and Q1 and Q2 are in some relation *f*{Q1, Q2} (consequental premise)**.**

What are resulting relations:
between P1 and Q1, and between P2 and Q2, other than the above given;
and between P1 and Q2, and between P2 and Q1 (conclusions)**?**

The common phrase "*kol davar shehayah bikhlal veyatsa...*" can now be interpreted more precisely. "*Kol davar*" refers to the minor term (S2); "*shehayah bi-*," to the latter's subsumption under the major term (S1, through the subjectal premise 'S2 is S1'); "*-khlal*," to the major premise (S1 is P1); and "*veyatsa*," to the minor premise (S2 is P2). Note that in all these rules, the underlying subject is, normally, a person or persons (even if a beast, plant or mineral is ever mentioned, the ultimate subject, to whom any law might be addressed, is human). The effective predicate is clearly a law or set of laws, by which we must in this context understand some prescription, prohibition, permission and/or exemption. Let us now look at the hermeneutic principles concerned in detail.

✡ **Rule No. 8** completes the said common phrase with the words ***...min haklal lelamed, lo lelamed al atsmo yatsa, ela lelamed al haklal kulo yatsa***. Translated literally, the principle states: "anything which was in a generality and came out of the generality, is to be taught: it is not to be taught 'about itself, it came out'; but it is to be taught that 'about the whole generality, it came out'".

We may suggest the following interpretation: "A subject (S2), by virtue of its subsumption under another (S1), was included in a generality (All S1 are P1); then it (S2) was treated distinctively (All S2 are P2). In such case, the distinctive predicate (P2) is to be taught: do not just teach it (P2) with reference to the singled-out species (S2), but also teach it (P2) with reference to the whole genus (S1) [so that All S1 are P2]". Thus, "*atsmo*" refers to the minor term (S2); "*yatsa*," to the minor predicate (P2); and "*haklal kulo*," to the major term (S1).

Although R. Ishmael's principle itself does not specify the following point, *judging by some examples given in the literature*, the rule of *lelamed* concerns cases ***where the minor predicate P2 is subordinate to the major predicate P1***. Thus, in this context, the predicatal premise undefined in our earlier general formula is:

All P2 are P1, but not all P1 are P2 (predicatal premise),

and the main conclusion apparently suggested by R. Ishmael is:

***All* S1 are P2** (main conclusion).

According to deductive logic, the said predicatal premise does not provide us with any additional inferences, other than the ones already obtained by other means (see above). Therefore, R. Ishmael's suggested conclusion is at best inductive. Deductive logic allows that a genus may have a generic predicate and a species of that genus have a more specific predicate; it does not insist that the genus follows suit and have the more specific predicate, too. R. Ishmael, on the other hand, apparently considers that, with regard to the Torah, the minor premise, or more precisely, the implication of the minor and subjectal premises, 'Some S1 are P2,' has to be generalized to 'All S1 are P2'.

> The example, reported by Bergman, on which I based the above formalization is: Exod. 22:18 sentences a sorceress to death (generality), while Lev. 20:27 sentences a male or female medium or necromancers ("in whom is a ghost [*ov*] or familiar spirit [*yidoni*]") to death by stoning (particularity); whence, granting mediums and necromancers to be included in the category of sorceresses (the textual basis for this subsumption is not given, note; also, commentators include sorcerers, arguing that the feminine is used only because most are women), it is inferred by such *lelamed* exegesis that sorceresses (of all kinds) are to be stoned. I noticed that the predicate change consists in adding a further precision (by stoning) to the original predicate (death sentence); and assumed this to be a *sine qua non* condition of application of this rule.

Note well that, according to natural logic, R. Ishmael's suggested conclusion is not impossible (no antinomy ensues from it); it is just a non-sequitur (not formally inevitable). The minor premise's implication is *lav davqa*, and may with equal possibility turn out to be general or contingent. Also, no redundancy would be involved in a *davqa* reading of 'Some S1 are P2,' contrary to R. Ishmael's generalization, i.e. such that 'Some S1 are not P2'. The suggested course is therefore an artificial one, recommended by a religious authority claiming Divine sanction. It is not essentially an inference, but a proposal that the minor premise *not* be read as exclusive.

Why the text did not simply say 'All S1 are P2' (instead of 'All S2 are P2') in the first place, if that is what it intended, is not explained; perhaps it would have been *contextually* inappropriate, suggesting false inferences from the surrounding context. Also, why the proposed inference is made, *rather than* reading the particularity as an exceptional provision, so that species of S1 other than S2 are *not* P2, though they are P1, is not explained. I would predict that the alternative reading of the particular, as a contingent, sometimes does occur in Rabbinic practice; but I have not searched for examples[229]. In any case, *deductively*, either outcome is formally acceptable; the proposed mood can only therefore be considered as an *inductive* preference, claimed as peculiar to Biblical exegesis.

✡ Bergman informs us that above is one version of the rule of *lelamed*, where the particular law teaches "about itself as well as the general law". In another version, according

[229] Frankly, in my view, the *davqa* reading would seem the more likely of the two (though not inevitable), because that would immediately explain why Scripture did not simply say 'All S1 are P2'.

to him, it teaches (not about itself but) "only about the general law". From the example he gives, however, I would strongly disagree with his rendering of the latter version, while quite willing to grant that it exists in Rabbinic literature. But before discussing our differences, let me present this additional version in formal terms.

> Let us first look at Bergman's example. Lev. 22:3 sentences he who approaches holy offerings while impure to the 'cut-off' (excision, *karet*) penalty (generality); Lev. 7:20 sentences he who eats peace-offerings while impure to the same penalty (particularity); peace-offerings are listed as among other holy offerings in Lev. 7:37 (to be precise, this verse does not mention the general category of holy offerings, but only lists various kinds of offerings: burnt, meal, sin, guilt, consecration and peace). It is thence inferred that the consumption (or approach?) of offerings of lesser holiness than peace-offerings, such as those for Temple maintenance (Bergman does not specify where in the text this distinction in degree of holiness is established), are *not* subject to cut-off. [230]

Although neither R. Ishmael nor his successors specify the following point, *judging by some examples given in the literature*, the variant rule of *lelamed* concerns cases ***where the major predicate P1 is subordinate or identical to the minor predicate P2***. Thus, in this context, the predicatal premise undefined in our earlier general formula is:

All P1 are P2 (predicatal premise),

and the main conclusion apparently suggested by Rabbis is:

Some S1 are *not* P2 (main conclusion).

Now, let us consider the syllogistic inferences we can make given this predicatal premise; there is only one, shown below. Notice that the result below is the same as the main conclusion of the original version of *lelamed*, except that here it is obtained by deduction, without need of an inductive extension.

From the major and predicatal premises, **All S1 are P2** (mood **1/AAA**).

Note that 'All P1 are P2' does not tells us whether all P2 are P1 or not all P2 are P1; either possibility is acceptable in the present variant, presumably. In the case where P1 and P2

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230 Note in passing that Scherman (p. 51) uses the same area of the text to illustrate the first variant of *lelamed*. From Lev. 7:19, which allows the ritually pure to eat [sacrificial] meat (and, therefore, supposedly, granting an exclusive reading of the text, forbids the impure from doing so), and v. 20, which decrees a penalty of *karet* for an impure person who eats peace-offerings, he infers the same penalty for *all* [holy] offerings. It is interesting that this sweeping conclusion is in disagreement with Bergman's more nuanced result obtained by means of the second variant of *lelamed*! I do not know which of them is considered Halakhically correct. However, my reading of v. 19 is that it refers to peace-offerings, since not only the previous verse but the two after concern these offerings, in which case Scherman's argument is not really a first-variant *lelamed*, but simply a generalization from peace offerings to all offerings (which does not mean Bergman is right, of course).

imply each other (i.e. are identical or logically equivalent), nothing more can be deduced from the given premises.

> There is a formal ***exception*** to the application of the second variant of *lelamed*, namely in situations where the rules of the *klalim uphratim* type are applicable. For the compound propositions 'G and S are P' and 'S and G are P', where S is subordinate to G, are each formally equivalent to a conjunction of the two simple propositions 'G are P' and 'S are P'. And according to R. Ishmael, the conclusions to be drawn in these situations are, respectively, 'Only S are P' (*davqa*, by rule No. 4) and 'All G are P' (general, by rule No. 5). It follows that, when we come across subalternative subjects with the same predicate, we must first decide which rule is applicable. According to Rashi (*Shevuot*, 7a), the *klalim uphratim* rules would be used when the subalternative subjects are close to each other in the text (in the same verse), while the said variant of *lelamed* would come into play when the propositions are relatively far apart. The conclusion obtained is different from that of *lelamed* variant two, note well, in the case of 'SG are P'; but in any case, the process as such is different even in the case of 'GS are P'. Similar comments apply to other forms of *klalim uphratim*.

We thus see that, in this second variant of *lelamed*, the 'conclusion' postulated by the Rabbis, 'Some S1 are not P2,' is precisely the *contradictory* of the conclusion required by deductive logic (taking the premises at their face-value)! I am therefore very tempted to entirely reject this form of reasoning as antinomial. In any case, I would bet that this procedure is not invariably followed in the situation concerned, since it is very likely to lead to eventual inconsistencies; but I have not sought for demonstrative examples. However, we must try and understand what prompted the Rabbis to propose such twisted logic, and how it can be formally expressed.

Apparently, what prompted the Rabbis to opt for such a convolution, is the fact that the major predicate (P1) is less extended than the minor predicate (P2), or of equal extension, whereas the major subject (S1) is more extended than the minor subject (S2). Why would Scripture do so, rather than say 'All S1 are P2' in the first place, knowing that we could automatically draw such an inference? Therefore, the Rabbis supposedly reasoned, Scripture does not want us to draw such an inference.

With regard to logical means for such a position: granting the predicatal premise, which distinguishes this *midah* from the others and defines it, the only way we can prevent the conclusion 'All S1 are P2' from being drawn, is to deny the major premise, 'All S1 are P1'. Note well that if we do so and say:

Some*, but not all*, S1 are P1 (particularization of major premise),

then the side conclusion that 'All S2 are P1' no longer follows, and the relation between S2 and P1 remains problematic.

> Objections which can be raised to this Rabbinical position are the following. If the Rabbis are surprised in the present case that the text did not immediately say 'All S1 are P2,' why were they not equally surprised in the previous case that the text did not directly say it, if that was its intention?
>
> Furthermore, in the case where P1 is subordinate to P2, there could be a *contextual* reason for giving the major premise a more specific predicate, to avoid some unwanted inference (such as a first variant *lelamed* from another minor premise) which could otherwise be drawn from a generic predicate. In the case where P1 and P2 are one and the same, the Rabbinical surprise can only be due to the different extensions of the subjects, S1 and S2; here again, a contextual explanation could be adduced: it

is conceivable that undesirable inferences might have been drawn from a misplaced generic subject or specific subject.

God, the writer of the Torah, may have thought: 'I can allow Myself such wording, since the Rabbis will recover My final intention eventually anyway, by syllogism through the predicatal premise.' The mere facts that the text is considered as written by a conscious Being and that syllogism is easy, does not prove that God intended what the Rabbis say He intended. An alternative course is sustainable, so their discomfort with the apparent redundancy was not justified. So much for evaluation; let us go back to description.

In the new variant of *lelamed*, the putative 'conclusion' denies the major premise. It is not a deduction (since in deduction, a conclusion can never contradict a premise), nor a particularization in reaction to textual inconsistency (since there was no contradiction between the premises, no conflict calling for reconciliation). Strictly-speaking, therefore, it cannot be called an inference, but at best a reading motivated by a vague discomfort with the logistics of the text. The Rabbis arbitrarily (without formal motive) reject literal reading of the major premise, 'All S1 are P1,' and tell us that it is not *davqa* general, but really contingent. Their alleged conclusion, that 'Some S1 are not P2,' is the cause, rather than the effect, of such reading. The anti-literal reading becomes necessary to prevent absurd consequences, only once the desired 'conclusion' has been artificially chosen; furthermore, that 'conclusion' does not necessarily follow such reading, it is only made possible by it.

Thus, the second variant of *lelamed* ends, rather than starts, with particularization of the major premise; no process is involved in getting to its main conclusion. Note that, in this context, the syllogistic inference from the original major premise (All S1 are P1) and the supposed predicatal premise (All P1 are P2), namely 'All S1 are P2', is Rabbinically interdicted.

It follows incidentally, from the main 'conclusion', as the Rabbis claim, that 'there is at least one species of S1 unlike S2, call it S3, which is not P2'; i.e. that the minor predicate is applicable only to the minor subject (and eventually others like it); the trouble with this eduction, however, is that it adds no concrete knowledge, since it cannot tell us *in what respect* other species are 'like' or 'unlike' the given species[231]. In effect, then, though the minor premise as such (All S2 are P2) remains unaffected, it becomes exclusive:

***Only* S2 are P2** (additional conclusion).

Note well that this exclusive proposition is not formally required as such, but is approximately true granting some leeway for the subject to expand somewhat (i.e. 'S2' here may include other species of S1 like S2, but in any case excludes some species of S1 unlike S2). The syllogistic inference that 'Some S1 are P2', from the minor premise and the subjectal premise (All S2 are S1), remains valid; and is of course to be conjoined to the Rabbis' conclusion 'Some S1 are not P2', to form a contingent proposition.

To repeat, the proposal of the Rabbis is logically untenable, unless we doctor the premises in a convenient manner. To *prevent* contradiction, the major premise 'All S1 are P1'

231 By definition, every species is in some respects different from, as well as in some respects the same as, other species of the common genus. In practice, the Rabbis rather arbitrarily propose divisions, without adductive control.

has to be denied, i.e. particularized to 'Some, but not all, S1 are P1'. However, this measure does *not* result in the desired main 'conclusion' being inferred deductively; it remains a 'foregone conclusion' (a thesis without justification in the premises, old or new). All that the adjustment of the major premise does, is render the main 'conclusion' formally conceivable; its preference by the Rabbis remains an inductive act. ***This act would be acceptable to science, if put forward as a tentative hypothesis to be tested by other data; however, pronounced as a fixed fiat, not open to review, it becomes, from the scientific point of view, an arbitrary act.*** The Rabbis, of course, claim Divine sanction for it; but we must point out that such a claim is not verifiable by scientific means. We shall leave the matter at that and move on.

> We can now return to criticism of Bergman's formulation. The distinction between the two variants of *lelamed* which he proposes is incorrect. In the first variant, we could, indeed, say that the particular law teaches "about itself as well as the general law," insofar as the minor predicate is Rabbinically applied to the major subject. However, it cannot be said, in the second variant, that the particular law teaches (not about itself but) "only about the general law". The particular law is in fact unaffected by the process, and the general law does not come to resemble it. The best we can say is that the particular law is viewed by the Rabbis as an *exception* to the general law; it makes the latter cease to be general. The minor predicate is reserved for the minor subject (and others eventually 'like' it), and other members of the major subject ('unlike' the minor subject) are deprived of the minor predicate.

Let us see, now, how we would have to interpret R. Ishmael's *lelamed* formula, so that it covers the second variant. To adapt the sentence "*kol davar shehayah bikhlal veyatsa min haklal lelamed lo lelamed al atsmo yatsa ela lelamed al haklal kulo yatsa*", we must read into it something to the effect that "A subject (S2), by virtue of its subsumption under another (S1), was included in a generality (All S1 are P1); then it (S2) was treated distinctively (All S2 are P2). In such case, the distinctive treatment (All S2 are P2) was intended to teach us something. It was not done just to teach us something about itself (S2) that the species was differentiated (in All S2 are P2), but also to teach us something [**else**] about the whole genus (S1) from which it was differentiated [**namely, that Not *all* S1 are P2**]".

In this modified version, we read the implicit word "else," meaning "other than the distinctive treatment," *into* the formula, so that the 'conclusion' be different for the genus than it was the species. Here, "*yatsa*" refers to the whole minor premise, rather than to the minor predicate, note.

Thus, we might distinguish the two variants of *lelamed*, by labeling the first "***lelamed oto hadavar leshar haklal***" (teach the *same* thing, P2, with regard to rest of the genus, S1), and the second "***lelamed hefekh hadavar leshar haklal***" (teach the *opposite* thing, notP2, with regard to the rest of the genus, S1). Compare this to Bergman's differentiation, "as well as the general" and "only the general," and you can see that he was inaccurate.

Let us now review the technical similarities and differences between these two versions of *lelamed*, other than their common grounds with the other rules of the type *kol davar shehayah bikhlal veyatsa*. (a) In both, the predicatal premise, which serves as the distinctive condition to application of the rule, asserts implication between the predicates; however, in the first version, which we have called *lelamed oto hadavar*, the minor predicate is subordinate to the major predicate; whereas in the second version, called *lelamed hefekh hadavar*, the major predicate implies the minor predicate. (b) The main conclusion of the first

is general positive (All S1 are P2), while that of the second is particular negative (Some S1 are not P2); they agree, however, that Some S1 are P2.

Finally, (c) they involve distinct thought-processes: *lelamed oto hadavar* proceeds by inductive generalization of a particular implication of the minor premise (viz. Some S1 are P2), whereas *lelamed hefekh hadavar* proceeds by arbitrarily postulating a conclusion contradictory to an implication of the major premise (viz. All S1 are P2) and consequent reconciliatory particularization of the major premise itself. Neither process is called-for or necessary according to natural logic, neither constitutes deduction from the predicatal premise which prompts it; but the artifice involved in the former is relatively straightforward, while that involved in the latter is more twisted.

> In view of the similar predicatal premises, the traditional classification of *lelamed hefekh hadavar* with *lelamed oto hadavar* seems sound. But at the same time, in view of the radical differences in process and conclusion, we may well doubt that the second variant was intended in the original definition of R. Ishmael. I suspect its formulation was a later development, even if it was used unconsciously earlier. It could equally well have been instituted as a distinct rule of the *kol davar shehayah bikhlal veyatsa* type. It resembles the rule of the *liton toan acher, shelo kheinyano* type (see below) in that it involves a particularization of the major premise, though for quite different reasons.

The next two rules (Nos. 9 and 10) continue the common phrase *kol davar shehayah bikhlal veyatsa...* with the words ***...liton toan acher***. We shall now analyze these.

✡ Let us first deal with **Rule No. 10**, which is easier. It completes the preceding clauses with the phrase ***...shelo kheinyano, yatsa lehaqel ulehachamir***, and may be translated literally as "anything which was in a generality and came out to posit another thesis, which is *in*compatible, came out to lighten and to harden". The expression '*shelo kheinyano*' tells us that the major and minor predicates are, by their very nature (or by virtue of some other part of the text, perhaps), incapable of conjunction in one and the same subject. They are not merely different, but mutually exclusive; there is a radical cleavage between them.

Thus, although neither R. Ishmael nor his successors specify the following point, *judging by some examples given in the literature*, the rule *liton toan acher, shelo kheinyano* concerns cases ***where the major predicate P1 and the minor predicate P2 are contrary or contradictory***. Thus, in this context, the predicatal premise undefined in our earlier general formula is, minimally:

No P1 is P2 (and No P2 is P1) (predicatal premise).

> Note that this gives a minimal definition of the incompatibility between P1 and P2 referred to. The bracketed clause is redundant, being implied anyway. In the case of contradictories, we must additionally say: **No nonP1 is nonP2** (which implies No nonP2 is nonP1). While in the case of contraries, we must add: **Some nonP1 are nonP2** (which implies Some nonP2 are nonP1).

A comment should be made here regarding *compound predicates*. If one predicate X consists of two concepts a + b, while the other predicate Y consists of only one of these concepts (say, a), *without mentioning the other* (b), then three readings are possible[232].

(i) X = 'a + b' and Y = 'a + b' *or* 'a + notb'. Here, knowing that either event may actually occur; the result is that X is included in Y, or in other words, Y is a *genus* of X (as well as of some other species, Z = a + notb). Therefore, we would apply the rule *lelamed*; opting for the variant *hefekh hadavar* if P1=X and P2=Y, or the variant *oto hadavar* if P1=Y and P2=X.

(ii) X = 'a + b' and Y = 'a + b'. Here, we have generalized factor 'b' from the 'a' in the case of X, to 'a' in all cases, including that of Y; the result is that X and Y are *identical*. Therefore, whether P1=X and P2=Y, or P1=Y and P2=X, we would apply the rule *lelamed hefekh hadavar*.

(iii) X = 'a + b' and Y = 'a + *not*b'. Here, we have generalized from the *non-mention* of 'b' with regard to Y, to the *actual absence* of 'b' in Y; the result is that X and Y are *incompatible*[233]. Therefore, whether P1=X and P2=Y, or P1=Y and P2=X, we would apply the rule *shelo kheinyano*.

Often, as Bergman acknowledges, Scripture displays a discrepancy, not *by commission* (assigning incompatible predicates to subalternative subjects), but *by omission* (as just described). As the above analysis shows, in the latter case, before we can apply one of the hermeneutic rules, a decision process must be followed[234]. Thereafter, if the compounds involved are found incompatible, we apply *shelo kheinyano*; otherwise, one of the variants of *lelamed*. It is noteworthy that the rule *shehu kheinyano*, as defined further on, never comes into play in this context![235]

Now, let us consider the syllogistic inferences we can make given the said predicatal premise, 'No P1 is P2':

From the minor and predicatal premises, **No S2 is P1** (mood **2/EAE**),
From the major and predicatal premises, **No S1 is P2** (mood **1/EAE**).

No additional inference is possible with the additional clause (No nonP1 is nonP2) of contradictory predicates, nor with that (Some nonP1 are nonP2) of contrary predicates, note.

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232 If more than two concepts are involved, we can easily reduce them to two. Thus, for instance, if X = 'a + b + c' and Y = 'a + b', then 'a + b' are effectively one concept and 'c' the other, for our purposes. However, note well, if there is, as well as a missing element in one of the compounds, any explicit incompatibility within them (for instance, X = 'a + b + c' and Y = 'a + notc'), then they (i.e. X and Y) are automatically contrary.

233 Note that, *granting 'a' to be true*, 'a+b' and 'a+notb' are no longer merely (indefinitely) incompatible, but become contradictory (i.e. not only they cannot be both true at once, but they cannot be both false at once).

234 The decision depends, in part, on the known relationships between the elements 'a' and 'b'. They must be compatible, since 'a+b' occurs, in our situation. If 'a' implies 'b', then 'just a' implies 'a+b'. In all other cases, the combination 'a+notb' remains logically possible, though in some cases it may be *materially* absent or even impossible, for natural or Scriptural reasons.

235 However, the situation of *shehu kheinyano* can indeed be predicted *in a wider perspective*, which consists in defining the two predicates, initially, as P1='a' and P2='b', then considering the logical possibilities of conjunction between the various combinations of a, b, and their negations. For P1 may equal 'a+b' or 'a+notb' or 'a+b *or* a+notb', while P2 may equal 'a+b' or 'nota+b' or 'a+b *or* nota+b'. These 3+3 combinations (of which 2 are disjunctive) imply nine conjunctions. Of these conjunctions, five are between incompatibles (*shelo kheinyano*), and four are between compatibles; of the latter, one yields 'P2 implies P1' (*lelamed oto hadavar*), one yields 'P2 is implied by P1' and one yields 'P2, P1 imply each other' (*lelamed hefekh hadavar*), and, finally, one (namely, the conjunction of the two disjunctions) admits of 'P2 being unconnected or subcontrary to P1'. This last case allows for *shehu kheinyano.*

Now, comparing these new results to the implications of the major and minor premises in conjunction with the subjectal premise, namely 'All S2 are P1' and 'Some S1 are P2', we see that they are respectively contrary and contradictory propositions. Thus, if, in the text, we come across subjects in a genus-species relation which have incompatible predicates, we are facing a situation of *formal inconsistency*. This is not an antinomy due to a Rabbinic interpretation, but one inherent in the text, note well. A formal resolution of the conflict is absolutely required.

It is a principle of inductive logic that harmonization is to be sought by effecting the *minimum* retreat from generalities, necessary to restore consistency; this is the most likely outcome[236]. If it can be shown that the subjects are not subalternative and/or that the predicates are not incompatible, we are of course no longer in the same situation and some other process may be appropriate. But, granting that the subjectal and predicatal premises are correct, the *only* way to achieve the required result is to *particularize the major premise*. With regard to the minor premise, if it is particularized alone, a conflict remains; it may of course also be particularized, but that does not affect the result. That is, logic indisputably demands that:

Some*, but not all,* S1 are P1 **(**resolution of conflict, leading conclusion).

The proof of what we have just said will now be presented:

- If we particularize only the minor premise, so that 'Some, but not all, S2 are P2', and we keep the major premise, then the following sorites remains possible: 'All S2 are S1' (subjectal) and 'All S1 are P1' (major) and 'No P1 is P2' (predicatal), therefore 'No S2 is P2'; but the latter conclusion disagrees with 'Some S2 are P2' (from minor); therefore, we still have an inconsistency.
- On the other hand, if we particularize only the major premise, so that 'Some, but not all, S1 are P1', and we keep the minor premise, then the following sorites remains possible: 'Some S1 are S2' (converse of subjectal) and 'All S2 are P2' (minor) and 'No P2 is P1' (converse of predicatal), therefore 'Some S1 are not P1'; and the latter conclusion agrees with 'Some, but not all, S1 are P1' (altered major); therefore, this measure resolves our contradiction.
- If we particularize both premises, no such sorites can be constructed. The results are equally acceptable; but this measure involves a more radical reaction than necessary, it goes beyond logical necessity. Thus, the minor premise might or might not be denied; what counts is denial of the major premise. The difference in behavior is due to the minor term being narrower than the major term.

That is, we must say that the text, which at first sight led us to believe 'All S1 are P1', was not intended to be taken literally, but only to suggest that 'a great many, perhaps most, but not all' of S1 are P1. The syllogistic consequences of this new result on the relations between S1 and P2 and between S2 and P1 are as follows.

From the minor and subjectal premises, **Some S1 are P2** (**3/IAI**).
From the major and predicatal premises, **Some S1 are not P2** (**1/EIO**).
From the major and subjectal premises, **no conclusion** (**1/IA?**).
From the minor and predicatal premises, **Some S2 are not P1** (**2/EIO**).

236 We cannot go into the complex proof of this principle here. It has to do with factorial analysis (see my work ***Future Logic*** on this topic).

The latter consequence is true whether the minor premise is particularized or not. If the minor premise *is not* particularized, we can moreover infer '**No S2 is P1**'; if, however, it *is* particularized (for independent reasons, for we have here no reason to do so), then whether 'No S2 is P1' or 'Some S2 are P1' remains an open question, formally. These consequences, together with the altered major premise (Only some S1 are P1), constitute our conclusions, according to formal logic. Now, let us turn to the Rabbis, and see what they say.

> An example of *liton toan acher shelo kheinyano* given by Scherman: Exod. 21:2-6 presents a set of laws relating to the release of a Hebrew slave (*eved ivri*, this is taken to refer to a thief sold by the courts to repay his theft, as per Exod. 22:2; for the self-sold poor, see Lev. 25:39-43); then Exod. 21:7-11 presents a very different set of laws for the release of a daughter sold as maid-servant (*amah*); conclusion, the initial set was for male Hebrew slaves only, and the laws of each group cannot be applied to the other group.[237]

Thus far, the formal conclusions apparently suggested by R. Ishmael are *identical* to those of natural logic, in the present rule. However, the above example suggests that the Rabbis take a more definite position and additionally conclude:

No S2 is P1 (additional conclusion).

Whether the Rabbis invariably go that far, or only occasionally, I cannot say without a full list of examples; but offhand, it seems pretty typical. This conclusion can be due to either of two policies. Either the Rabbis consider that the minor premise ought to be kept general, i.e. as 'All S2 are P2'; in which case, the said additional conclusion follows from the minor and predicatal premises deductively. Or the Rabbis consider that the minor premise ought to be particularized; in which case, their arrival at the additional conclusion is due to a generalization from the implication 'Some S2 are not P1' of the minor and predicatal premises. The first alternative is preferable to formal logic, in that no unnecessary doctoring of given data is involved. The second alternative, if used by the Rabbis, would constitute an inductive act (regarding which we can reiterate the remarks previously made in similar circumstances; namely, that such an act is arbitrary, if presented as a fixed rule; though scientifically acceptable, if presented as a tentative hypothesis).

✡ **Rule No. 9** completes the common phrase *kol davar shehayah bikhlal veyatsa...* with the words ***...liton toan acher, shehu kheinyano, yatsa lehaqel velo lehachamir***, and may be translated literally as "anything which was in a generality and came out to posit another thesis, which is compatible, came out to lighten and not to harden". The expression '*shehu kheinyano*' is at first unclear; but we can arrive at its intended meaning by a process of elimination. '*Shelo kheinyano*' (see rule No. 10, above) clearly refers to an incompatible

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237 This is not a very good example, in my view, since the text describes the slave as possibly having a wife (implying him a male), and concerning the maid-servant says "she shall not go out *as the men-servants do*" (referring apparently to the preceding verses concerning the Hebrew slave), so that the subjects obviously do not overlap and the proposed inference is unnecessary. I wonder, too, if female thieves are sold by the courts; in any event, the daughter is not sold by the courts. However, ignoring all that, we may use the differing laws of release as a partial illustration. Better examples are given further on.

predicate; so, '*shehu kheinyano*' must refer to some kind of compatible predicate; however, it cannot refer to a minor predicate which subalternates or mutually implies or is subalternated by the major predicate, as such relations have already been treated under the headings of *lelamed*; therefore, '*shehu kheinyano*' must specifically refer to a subcontrary or an unconnected predicate. That is, here, though the two predicates are by their natures different, in the sense of distinguishable, they are not mutually exclusive, but *conjoinable*.

> Traditionalists may not agree with this definition of *shehu kheinyano*. They might distinguish it from *shelo kheinyano*, by saying that both concern somewhat divergent predicates, the former's are 'of similar subject-matter', while the latter 'of different subject-matter', or something to that effect. But such a distinction is of little practical value, because it is difficult to determine by its means what is "different, but not very" and what is "very different"; the distinction in practice becomes pure guesswork, or (they might say) a matter of 'oral tradition'.
>
> Though I try my best, I see no way to enshrine such a distinction in formal terms. It cannot, for instance, be ascribed to the issue of compound predicates (see above). A genetic explanation may be the relation between two degrees of a concept X, say X1 and X2, and an incompatible of it, say Y (implying nonX): we could say that the greater X (X2) is further than the lesser X (X1) to nonX (considered as X=0); but both X1 and X2 remain in conflict with Y. The notion of "less" or "more" incompatible is, strictly speaking, a mixed bag. For formal logic, all incompatibilities are equivalent, without degrees; things either *cannot* coexist, or they *can* coexist (under certain conditions).
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> The examples which commentators usually give for the two processes are clearly identical from a formal point of view: substitute symbols for the terms, and you will see that the predicates are formally incompatible in both sets of examples. It follows that there is no way to justify different procedures for the two situations. Furthermore, if both rules of *liton toan acher* indeed referred to incompatible predicates, then R. Ishmael's hermeneutics would be short of a comment on compatibles (in the sense, unconnecteds or subcontraries).

Thus, although neither R. Ishmael nor his successors specify the following point, we can say that the rule *liton toan acher, shehu kheinyano* concerns cases ***where the major predicate P1 and the minor predicate P2 are unconnected or subcontrary***. This hypothesis is based on the said process of elimination, and *hopefully will eventually be confirmed by some examples given in the literature*. In this context, then, the predicatal premise undefined in our earlier general formula is, minimally:

Some P1 are P2 and some P1 are not P2, and
(some P2 are P1 and) **some P2 are not P1** (predicatal premise).

> Note that this gives a minimal definition of the sort of compatibility between P1 and P2 referred to. The clause 'Some P1 are P2' serves to eliminate incompatibilities, which are dealt with under the heading of *shelo kheinyano*; the bracketed clause 'Some P2 are P1' is implicit in it, and so could be left out. The clauses 'Some P1 are not P2' and 'Some P2 are not P1' serve to eliminate implicational relationships, which are dealt with under the heading of *lelamed*. In the case of subcontraries, the clause '**All nonP1 are P2**' (which implies 'All nonP2 are P1') would have to be added; in that case, the clauses 'Some P1 are not P2' and 'Some P2 are not P1', being both implied by the larger clause, could be left out. In the case of unconnecteds, the clause '**Some nonP1 are not P2**' (which implies 'Some nonP2 are not P1') would be added, instead.

Now, let us consider the syllogistic inferences we can make given the said (compound) predicatal premise. In conjunction with the major premise, all we can formally infer is that

Some P2 are not S1 (mood **2/OAO**). However, this information tells us nothing of the relation of S1 to P2 (in that order), other than what we already know from the minor and subjectal premises, viz. that Some S1 are P2 (which is indefinite, note). Similarly, we can infer, from the predicatal and minor premises, that **Some P1 are not S2**; but this information tells us nothing of the relation of S2 to P1 (in that order). [238]

Before we can present and evaluate, by formal means, the conclusion(s) proposed by the Rabbis in such case, we have to find a statement or example which somewhat clarifies the matter, as we did in other cases. The problem, here, is that the statements and examples I have so far come across concerning the present rule are ambivalent[239]. So we have to proceed in a different manner, and look for an example which, had the Rabbis been more aware of the formal issues involved, they might well have classified under this heading. This proposed approach is admittedly highly hypothetical. For the present research project is not essentially prescriptive, but descriptive; its purpose is primarily, not to tell the Rabbis how they *should* interpret texts, but to discover how they *do* interpret texts. We wish to evaluate *their* methods, not invent methods for them. A value-judgment is ultimately intended, but only after we have something of theirs to evaluate.

Nevertheless, remember, we arrived at our hypothesis concerning the form of *shehu kheinyano*, not out of the blue, but by a gradual discovery of the forms of the other subdivisions of *kol davar shehayah bikhlal veyatsa*. Our hypothesis was therefore grounded in Rabbinic practice to that extent, being the only leftover form available. It is, of course, conceivable that R. Ishmael and his successors never had to deal with the situation of compatible (but not subalternative or implicant) predicates in practice, and therefore had no need to develop a hermeneutic response and corresponding rule. This empirical issue is hard for me, personally, to resolve at this time, since I do not have a full inventory of the instances of Rabbinic exegesis at hand. However, I have found a couple of examples in the literature, in which the predicates are *objectively* in the required relation, even though they are classified differently by tradition (see **Appendix 6**).

Objectively, these examples should be classed as *shehu kheinyano*; but traditionally, one of them is classed as *shelo kheinyano* (rule No. 9, above), and the other as *lidon badavar hechadash* (rule No. 11, below; but note, regarding the latter example, that it may also be classed as *shelo kheinyano*, according to how the major premise is read). Thus, the conclusions they yield vary in form. But we cannot, in any case, presume to predict, on the basis of such reclassifications, what the formal conclusions preferred by the Rabbis might be for *shehu kheinyano* situations; for if they had been aware of the compatibility of the predicates in the suggested examples, they may have proposed other conclusions than those they proposed while unaware. To know for sure, we need an example which is both objectively *shehu kheinyano* and regarded as such by tradition, which to date I have not found.

The issue must therefore be left open, pending the gathering of more data. That is not a big problem, because, whatever the response of the Rabbis happens to be, we have by now

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238 For the record, note also that, in the case where P1 and P2 are subcontrary, nothing more can be deduced from the given premises.

239 An acquaintance of mine, Mr. S. Szmerla, pointed out to me, when I asked him for examples, that it is quite possible that some of the hermeneutic rules have only one or two actual instances. It is therefore not at all sure that we will find a sample, which is recognized by both the Rabbis and logicians like me as *shehu kheinyano*. A systematic listing and analysis of all exegetic acts in the Talmud is highly desirable, evidently.

made clear the method by which such response is to be treated: it is to be formalized (substituting symbols for content) and compared to the results syllogistic logic.

We shall now venture some remarks regarding the final clauses of R. Ishmael's *liton toan acher* rules, concerning **leniencies and severities**. Rule No. 9, *shehu kheinyano*, ends with the phrase ...*yatsa lehaqel velo lehachamir* (meaning: was singled out to alleviate *and not* to aggravate); and rule No. 10, *shelo kheinyano*, ends with the phrase ...*yatsa lehaqel ulehachamir* (meaning: was singled out to alleviate *and* to aggravate). Traditionally, these phrases are taken to characterize the result of exegesis, by comparing the general and particular law.

> Examples. (a) 'Alleviation and not aggravation': Scripture prescribes the death sentence for killing someone, except in a case of manslaughter, for which the sentence is exile instead of death; thus, for manslaughter, the sentence is lighter and not heavier. (b) 'Alleviation and aggravation': Scripture prescribes payment of a ransom for his life to the master of an ox which kills someone, except in a case where the victim is a slave; in the latter case, the ox's master pays the slave's master a fixed sum (30 silver shekels), whatever the market value of the slave; since the market value of the slave may be more or less than the fixed sum, the latter sentence involves both leniency and severity.[240]

These characterizations have no formal moment, according to our analysis. We cannot predict, on *formal* grounds, how the general and particular laws, so-called, will compare with respect to leniency or severity. It is clear that such characterizations are essentially ex post facto summaries based on *material* data[241]. If it so happens that wherever *shehu kheinyano* or *shelo kheinyano* exegesis has been used, the results are found to have this or that character, the summaries are true; otherwise, not. It is conceivable that Scripture and Rabbinic exegesis happen to conform to those patterns, but there is no logical necessity that they do. For as far as logic is concerned, anything goes in this respect. This means that the phrases in question do not play a role in getting us to the conclusions; they are technically useless in determining the Halakhah.

With regard to the material issue, I have no direct interest. But it is worth pointing out that R. Ishmael's said clauses do not seem to be based on *complete enumeration*, as they ought

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240 Example (a) is from Scherman. Example (b) is Abitbol's. However, it should be clear that, in the latter example, the focus of comparison is incorrect: we should not be comparing the fixed sum to the market value of the slave (as Abitbol does, following tradition, presumably), but to the ransom for the ox master's life. If the ransom for a free man's life is uniformly greater than the fixed sum for a slave, then the law for the slave case 'alleviates but does not aggravate'. If the ransom may be greater or smaller than the fixed sum, then we might say the fixed sum 'alleviates and aggravates', in this sense (instead of Abitbol's). Another criticism: in any event, none of these interpretations allows the phrase 'alleviate *and* aggravates' to be used; the accurate rendering would have to be 'alleviates *or* aggravates', judging by this traditional example. However, this may be judged an issue of translation, since '*ve-*' is in other contexts read as 'or' as often as 'and'. All that goes to show the approximativeness and unreliability of Rabbinic thinking.

241 Another example worth noting. Concerning the Hebrew slave and maid-servant case, considered earlier: Scherman explains that the maid-servant benefits from certain leniencies and stringencies denied to males, such as that she may go free even before six years of service and her master can betroth her against her will. But, I say, these differentia are given by the text, they are not outcomes of exegesis; it would change nothing to the reasoning process if there were *only* comparative leniencies or *only* comparative stringencies, *so long as* at least one pair of predicates was incompatible.

to be, but on *generalization* from a few instances. This is suggested by Bergman's comment concerning *shehu kheinyano* that "(Although the formulation of this rule states 'to be more lenient rather than more severe,' the converse also holds true.) If the item is specified for purposes of stringency, it is not given the leniencies of the general law." It is also evident, in several Rabbinic examples, that the characterizations are often forced, in an effort to fit R. Ishmael's statements. Clearly, R. Ishmael based these phrases on overly hasty generalization, from observation of a limited sample of cases. Therefore, they are not only formally unjustifiable, but empirically inaccurate. Consequently, R. Ishmael's formulations are overly restrictive, in practice.

Nevertheless, let us look further and see whether we can anyway draw some useful information from R. Ishmael's last clauses, of a formal or methodological sort.

> A possible formal interpretation is the following.
>
> If we consider the overall outcome of *shelo kheinyano* exegesis, what essentially happens is that the major and minor premises are respectively narrowed down and made exclusive, so that the major and minor subjects end up with *separate* predicates. We could say, loosely speaking, that this result 'both alleviates and aggravates', in that, whatever they are, the leniencies and stringencies of the major premise are not applied to the minor term and the leniencies and stringencies of the minor premise are not applied to the major term. Thus, the final clause of R. Ishmael captures the 'spirit' of this rule, though not its 'letter'.
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> If, now, we turn to the *shehu kheinyano* rule, and R. Ishmael's final clause 'alleviates but does not aggravate', and we assume that, here too, he was referring to the 'spirit', rather than the 'letter', of this type of exegesis, we might suppose that the conclusions he would recommend, in situations where subalternative subjects have compatible predicates, are such that the minor premise ends up 'lighter' than the major premise. A relatively formal interpretation of this (with reference to a number of predicates), would be that the minor subject ends up with only its own predicate exclusive of the other predicate, while the major subject exclusive of the minor subject ends up with both predicates[242].
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> I offer this remark very speculatively, without even looking for examples; I very much doubt that that was R. Ishmael's formal intention. Note that, in any case, some residue from the original text must remain: at least some S1 have to be P1 and at least some S2 have to be P2[243].

Our best bet is a *methodological* interpretation, which goes as follows. This explanation refers to advice broader in scope than the concerns of deductive or formal-inductive logic.

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242 A more material interpretation (ignoring Bergman's above-mentioned comment), would be the following. If P2 is *more lenient* than P1, then people in group S2 should not receive the greater burden of P1, but remain P2 only; while the rest of those in group S1 may remain P1 only, or be both P1 and P2; this is the most fitting case, of course - probably just what R. Ishmael had in mind. However, if P2 is *more stringent* than P1, then either people in group S2 should have their burden decreased, by being both P2 and P1, while the rest of those in group S1 remain P1 only; or alternatively, people in group S2 remain P2 only, while the rest of those in group S1 should have their burden increased, by being both P1 and P2; but in either of these cases, note, the burden of S2 people is still greater than that of the rest of S1 people, at the end. (Taking Bergman's comment into account, the predicates in the latter event would be kept separate, as in the former case.) It is evident, in view of the multiplicity of possible hypotheses, that R. Ishmael's phrase 'alleviates but does not aggravate' is very ambiguous, and therefore no sure guide.

243 This is true in all exegesis: it is granted by the Rabbis, who said *ain miqra yotse miyedei feshuto* ("a Scriptural verse never loses its plain meaning", *Enc. Jud.* referring us to *Shab.* 63a, *Yev.* 24a). In formal contexts, 'simple meaning' refers to the minimum necessary implication of any proposition, namely an indefinite particular.

With reference to *shelo kheinyano*, we could impute R. Ishmael as saying that, since the major premise has been proven, by ensuing inconsistencies, not to be universal, we must henceforth proceed very carefully and, unless or until otherwise demonstrated, look askance at any *other* statement we encounter in the text concerning the major term, before extending it to the minor term (through some other exegetic rule). This is reasonable and wise advice. As examples show, such a recommendation does not exclude in advance the possibility that the major and minor terms have some legal predicate(s) in common (they are bound to at least have some non-legal predicates in common, else they would not be subalternative); it only serves to instill caution in the exegetic process.

Our usual epistemological approach is to accept appearances or statements at their face-value, barring reason to deny them; this might be called 'the easygoing approach'. In the *shelo kheinyano* situation, however, in view of our having encountered one inconsistency, we have grounds to expect others; so we would be wise to withhold immediate credulity from subsequent appearances or statements, barring reason to affirm them; this might be called 'the cautious approach'. These approaches may be analogized to the ways people can be judged: as 'innocent until proven guilty' or 'guilty until proven innocent'. The former gradually excludes certain items (which prove untenable), the latter gradually includes certain items (which prove tenable). In practice, we operate somewhere in the range between those two extremes.

With reference to *shehu kheinyano*, accordingly, since no inconsistency is implied, the appropriate approach would be 'easygoing'. Obviously, whatever leniency or stringency is introduced by the minor premise, exempts its subject from incompatible stringencies or leniencies applicable to the major subject in other propositions; but such exemptions emerge from distinct arguments, under the *shelo kheinyano* rule; so they are not, properly speaking, a direct outcome of the *shehu kheinyano* rule. However, residual factors specified or implied somewhere in the text with regard to the major subject, which have not been explicitly or by implication eliminated by the minor premise, may reasonably be assumed to remain applicable to the latter's subject, unless or until we have reason to believe otherwise.

In this perspective, the phrase *lehaqel velo lehachamir*, used for *shehu kheinyano*, is especially intended to *contrast* with the phrase *lehaqel ulehachamir*, used for *shelo kheinyano*, with respect to this issue of methodology.

✡ **Rule No. 11**, the last of the principles starting with the common phrase *kol davar shehayah bikhlal veyatsa...*, completes it with the words ***...lidon badavar hechadash, y ata yakhol lehachaziro likhlalo, ad sheyachazirenu hakatuv likhlalo beferush***. Translated literally, it says: "anything which was in a generality and came out to be dealt with within a new matter, you cannot return it to its [initial] generality until Scripture returns it to its [initial] generality explicitly". This rule, albeit superficial appearances is very different from the preceding three. It may be stated as 'if a member of a certain class, subject to certain predicate(s), *becomes* a member of a new class entirely, subject to other predicate(s), then again *becomes* apparently subsumed under its initial classification, it should not recover the predicates of that classification, except in the event that Scripture clearly grants such recovery'. In symbolic terms, this definition says the following:

(i) at first, **x, an individual, is S1, a subject-class,**
and All S1 are P1, a predicate (whence x is P1)**;**

(ii) later, **x ceases to be S1 and becomes S2, another subject-class, and All S2 are P2, another predicate** (whence x is P2)**;**

(iii) yet later, **x ceases to be S2 and becomes S1** (though No S2 is S1)**;**

(iv) in such eventuality,

though x is (again) **S1, it is *not necessarily*** (again) **P1, and**

though x is not (any longer) **S2, it is *not necessarily* not** (any longer) **P2.**

A note on terminology, with regard to this rule. It consists of three (compound) premises, with an underlying subject (x), two subject-concepts (S1, S2) and two predicates (P1, P2). We shall refer to the premises as the major (i), minor (ii) and middle (iii), though their conceptual levels are independent; and to the respective subjects and predicates of the major and minor premises accordingly. The (compound) 'conclusion' (iv) is a modal statement (of the logical type), forewarning us *not to* draw certain hasty inferences from the premises.

Let us analyze this situation. We are concerned, here, not with the various classifications of different individuals (extensional modality), but with actual travels of an individual from one class to another and back (natural modality). In the preceding three hermeneutic rules (Nos. 8-10), the issue was how to handle a static situation, where Scripture treats subjects belonging to a subclass seemingly somewhat differently from the way they are treated in the framework of an overclass. The individual subjects *are* members of the two classes simultaneously; they are not undergoing change, in the sense of *becoming*, actually ceasing to be one thing and then reemerging as something else. In the present rule, we confront the issue of metamorphosis, which has very distinct logical properties[244]; specifically, the issue is a circular movement: membership in one class, then shift over to a *new* class, and finally *return* to the original class.

I derived my reading of the rule from an illustration given by Scherman. Lev. 22:10-11 inform us that common Jews (non-priests) and tenants or hired servants of priests are forbidden to consume 'holy things', while servants bought by priests or born in their house may do so. We know (either by a *davqa* reading of the latter verses, or a *qal vachomer* from home-born servants, or from an unstated verse) that a priest's daughter (our symbol, x), whether as a member of her father's household before she marries a commoner or as the wife of another priest (S1), is permitted such food (P1). Verses 12-13 tell us that it is, however, forbidden (P2) to her (x) while married to a commoner (S2); though if she is thereafter widowed or divorced... and returns to her father's house, as in her youth (S1), she may consume it (P1). In our example, Scripture happens to explicitly grant reentry of the daughter under the category of priest's household for the purpose of eating holy things; but the fact that this had to be specified is in itself significant, implying that it could not be simply presumed from the mere fact of her return home (or coupled with a-fortiori from v. 11 concerning bought servants, who are newcomers to the household).

In the rule of *lidon badavar hechadash*, unlike the others, *the categories of subject (S1, S2) are not overlapping, they are at variance (they have a common member, x, but at different times)*; as for the predicates (P1, P2), their mutual relationship is irrelevant, here. The major predicate (P1) applies to our individual *qua* (in his capacity as, by virtue of) his belonging to the first subject-concept (S1); similarly, the minor predicate (P2) comes to apply to it *qua* the second subject-concept (S2). With reference to the third premise, a legitimate question arises,

244 See our logic primer, ch. 1.2.

was the original subject-class (S1) intended broadly enough to include returnees from an alternate subject-class (like S2), so that the earlier predicate (P1) again applies; or does the later predicate (P2) remain in force (or, perhaps, some third predicate come into play)?

From the point of view of syllogistic logic, granting the premises at their face-value, the general element of the major premise, 'All S1 are P1', combined with the final element of the middle premise, 'x is (again) S1', would formally yield the conclusion 'x is (again) P1'. As for the elements 'x is no longer S2' of the middle premise and 'All S2 are P2' of the minor premise, they do not clarify whether x has remained P2 or is no longer P2 (of course, if P1 and P2 are incompatible, x must cease to be P2; but if they are compatible, the final predicate of x is undetermined). R. Ishmael is clearly aware of these two logical consequences; however, he forewarns us not to blindly follow the first (though, concerning the second, he and formal logic agree).

If we accept the first premise as literally general, our conclusion has to be that the first predicate again comes into force. However, in view of our knowledge that (a) *changes of the kind considered do occur in nature and Scripture*, and keeping in mind that (b) *the intent of general statements in the Torah is occasionally not literal*, we cannot presume such an automatic conclusion, and are wise to leave the question open, awaiting Scripture's answer (directly or indirectly). The literal option is deductive, the anti-literal one is inductive. This hermeneutic rule, instead of advocating some conclusion, preempts any eventual conclusion; its purpose is to ensure that deductive logic is not mechanically used, when the events described take place, unless the text justifies it.

More precisely, according to this rule, if Scripture reiterates the subsumption of the ambulant individual under the major premise (after the said changes), then the major premise's generality is confirmed; if, however, Scripture fails to do so explicitly, the suggested reaction is, effectively, to *particularize the major premise* to 'Not *all* S1 are P1'. These alternative further proceedings (confirmation or particularization of the major premise) constitute a finite conclusion; so the process *lidon badavar hechadash* can be said to have conditional conclusions (rather than merely inhibiting any conclusion).

> The above treatment of the rule is different from the traditional, but I think there is no possible doubt that the situation we have described is what R. Ishmael was trying to project. His use here of the qualifier *chadash* (new), rather than *acher* (other) as in the preceding two rules, confirms my view, as it suggests actual change of something, instead of a mere intellectual separation between different things. In any event, it would certainly be a wise rule to have; and traditional formulations, as we will now show, do not add anything of practical value to the previous rules and so cannot be appropriate.
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> If we read this rule as traditionally done, the formalities are indistinguishable from those of the rule *shelo kheinyano*, if not also the rule *shehu kheinyano*[245]. But there is no way for formal logic to discriminate between 'degrees of difference' between incompatible classes, so that any principle formulated on such basis is bound to be subjectively used. The traditional reading is thus, for all practical purposes, indistinguishable and useless. If we are to assume R. Ishmael to have been saying something meaningful and valuable, the reading I have proposed (based, note well, on an accepted example) seems a better candidate.

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245 The traditional reading of *shehu* is formally indistinguishable from *shelo*; so in that reading both are indistinguishable from *lidon badavar hechadash*. But if we read *shehu* as concerned with compatible predicates, as I do, then it is not comparable to the traditional reading of *lidon*.

It has to be said that ***the forms ascribed to material cases by the Rabbis are often wrong***. Because of their lack of formal tools, the Rabbis often misread the hermeneutic principles; that is, they misplace examples, and since their understanding of the principles is largely based on examples, they are often at a loss to clarify the whys and wherefores of their reasoning processes and to distinguish them from each other. One might have supposed that, since *they* formulated the principles in the first place, they ought to know more than anyone else just what they mean by them and be free to classify examples under the headings of their choice. But the issue is more complicated than that.

It is evident that the theory and practice of Rabbinic exegesis developed in tandem, over time. The Rabbis observed themselves thinking in a certain manner in certain situations, and subsequently were encouraged to think in the same manner again in other situations. Very often, the similarity between the situations was 'forced', and we can see a very artificial effort to jam the example into a mold, to make it fit-in to the desired format[246]. The fact that the formats were themselves rather vaguely defined, facilitated such square-peg-in-a-round-hole antics. But also, we see an uncertainty concerning the opposition of terms or theses: 'different' is often confused with incompatible; incompatibility is thought to have degrees; the formal opposition of compounds is not analyzed; and so forth.

All this is further complicated by the existence, in Rabbinic thought processes, of implicit (hidden or not consciously acknowledged) generalizations and exclusive readings, which are just taken for granted. The claim of Sinaitic tradition which gradually developed, and the intimidation it occasioned (the reluctance to question past authorities for fear of rejection by one's peers), caused the accumulation and perpetuation of such errors, because the process of repeated peer review which normally would uncover and correct errors was considerably inhibited. At best, we can call it incompetence; at worst (to the extent that the authors concerned sensed that they were misrepresenting the principles or contriving the compliance of examples) deception and manipulation.

As a consequence of the various circumstances just described, exegetic acts are wrongly classed, under rule 10 instead of 9 or 9 instead of 10, or 11 instead of 9 or 10, for instances (examples of such misclassification are presented and analyzed in **Appendix 6**[247]).

Before closing the discussion of the five *kol davar shehayah bikhlal veyatsa...* rules, I want to again emphasize that my analysis was ***based on formalization of a limited number of examples***. It therefore depends on generalization; for it is not inconceivable that examples exist where the Rabbis have drawn conclusions of objectively other forms than those here encountered (whatever their theoretical claims). Ideally, our study should have been based on *comprehensive enumeration* of all Talmudic (and post-Talmudic) exegetic acts; such a feat is

246 This effect is sometimes achieved by *passing over some relevant detail* in the written text, as we see in an example given further on. We might regard this as a non-formal issue; or refer to it as a failure to take into consideration the full context of information available. There are no doubt other ways 'molding' occurs. The reason for this practice is that it 'legitimizes' an argument, gives it a semblance of being traditional.

247 I apologize to readers for going into such detail, but it is necessary, to substantiate my serious accusations. I hope one day someone takes the trouble to analyze all extant Rabbinic arguments in equal, and indeed greater, detail; it bothers me when people get away with fallacious reasoning. It should be clear that it is not the *content* that concerns me, I do not care what the Halakhic outcome is; what is important is that the *process* be valid.

beyond my reach, since I lack the necessary linguistic tools (Hebrew and Aramaic) and since as far as I know no one has drawn up the required listing (let alone in English) - but I hope someone will one day perform the feat. Nevertheless, what is reasonably certain is that I have formalized the examples available to me accurately, so that we now have an at least partial formal picture of actual Rabbinic thinking processes, enough to formulate a verdict of sorts (comparing the empirical data to Rabbinic pronouncements and to formal logic).

In any case, this research at least has served to establish ***a clear and sure methodology for the independent audit of Rabbinic harmonization rules and acts***. That is in itself a highly important finding, which took time and effort to develop, since no one had done it before and it was not immediately evident.

✡ Finally, we come to **Rule No. 13**, which states: ***vekhen, shnei khetuvim hamakhechishim zeh et zeh ad sheyavo hakatuv hashlishi veyakhriyaa beneihem***. This means, clearly, 'two writings which deny each other until a third comes which reconciles them'. It refers to a situation where we come across two propositions in Scripture, say P and Q, which appear conflicting; the *midah* recommends we find a third proposition in the text, R, which somehow or other resolves the disagreement between them. Such reconciliation may logically result in neither, or either, or both, the initial two propositions being modified by the third, depending on the role the latter plays:

- **P and Q remain finally unaffected by R; but R shows that *the presumed conflict* does not in fact occur in their case.**

> An example given in *Enc. Jud.*: according to Exod. 19:20, "the Lord came down upon Mount Sinai", and according to Deut. 4:36, "out of heaven He made you hear His voice". These passages seem to imply that God was both *down* close to the Earth and *up* in the heavens; but the apparent antithesis is dissolved, by *Sifra* (1:7), which alleges[248], with reference to Exod. 20:19, "ye yourselves have seen that I have talked with you from heaven," that God brought the heavens down with Him when He spoke. Here, the assumption that the heavens stayed in their normal place (up), which was the source of conflict, is denied.

- **P and Q are finally admitted to be in conflict; but R shows P and/or Q to be *more limited* than presumed, one or both being in fact conditional rather than (as apparent) categorical, or contingent rather than (as apparent) general.**

> An example given by Bergman, Num. 7:89 says that "Moses went into the Tent of Meeting" to speak with God, whereas Exod. 40:35 says that he "was not able to enter into" it, adding "because the cloud dwelt thereon". The latter clause was needed to resolve the contradiction between the first two statements, making them both conditional: Moses came in and spoke with God *when* the cloud departed, and he stayed out *when* it was there.

Note the distinct symbolization used in the present rule, in comparison to the other hermeneutic rules: here, we refer to whole propositions (P, Q, R) of whatever form, rather than to propositions of specified forms (as with a-fortiori argument or with the preceding rules of

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248 The reading in *Sifra* is by no means that I can see obvious; so this is not an example of Scriptural reconciliation, but merely one of Rabbinical reconciliation. See further on.

harmonization), or to terms (as with *klalim uphratim*). The 13th rule is the least structured and mechanical of the harmonization rules: we must look all over the text for a premise which is not formally pre-defined, so that our intuitive faculty is more active. Whereas in the other rules, the result is arrived at (for good or bad) more directly and virtually automatically.

The processes involved here are perfectly natural inductive processes, widely used to harmonize apparent divergences in the ever-changing context of empirical and rational knowledge. In natural contexts, they serve to restore consistency when it seems momentarily lost, adducing that either the apparent conflict was illusory for some reason, or that one or both of the conflicting theses were over-generalized or under-particularized or otherwise off-the-mark. In a Scriptural context, it is hopefully the text itself which provides the solution to the problem, informing us of some natural event or specification, or in certain cases a miracle, which modifies our reading of the situation and removes any antinomy.

> Note that, according to *Jew. Enc*., R. Akiba considered the resolution to be adoption of one of the conflicting propositions, whereas R. Ishmael opted for the view that both are to be modified. But I stress that, formally speaking, there are many possible resolutions, as here specified.

It has to be said that the conflict may not be immediately obvious; often, it is only noticed centuries after the Talmud, sometimes by a picky commentator out to make some point. Also, as originally formulated, the rule of *shnei khetuvim* predicts that a third proposition, *hakatuv hashlishi*, will be found in the text to restore the lost equilibrium. However, that is often not literally the case; often, the conflict is actually resolved only by Rabbinic intervention, with reference to a commentary well-established in the oral tradition or by means of a new commentary (with, in many cases, different commentators making different suggestions). In my view, such external intervention requires no special dispensation, since the process, as already noted, is quite legitimate according to generic logic; provided, of course, that it is properly carried out, that is to say, *flexibly willing to revise postulates which eventually cause difficulties of their own*.

> Some commentators (Bergman cites *Tosefos Haazarah*) have felt a need to justify Rabbinic intervention, and did so with reference to the phrase *vekhen*, which begins the formulation of this rule by R. Ishmael. They read *vekhen* as "and, similarly," and refer it to the preceding rule (No. 12), claiming that the present rule concerns situations where no harmonization is given by the immediate context (*meinyano* or *misofo*), and empowers the Sages to decide the issue[249]. However, this attempted justification does not account for the reference to a third *Scriptural* passage (*hakatuv hashlishi*). Indeed, according to that view, when Scripture explicitly resolves the conflict, no exegesis has actually taken place, and the rule only refers to situations where Scripture remains silent!
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> But, in my view, the phrase *vekhen* could equally well, and more credibly, be read as "and, also," and taken to refer loosely to all the preceding hermeneutic rules, merely implying that the present rule is the last in the list (or, perhaps, last but not least). When Scripture provides a solution of the problem, it is still exegesis, insofar as we have to find the relevant passage; the rule, in such case, serves to remind us to look for it. As for where Scripture does not seem to provide a solution, why not say that such cases are dealt with using R. Ishmael's other rules of harmonization. In practice, it is a very fine

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249 In other words, according to this view, rule No. 13 concerns, not explicit (*meforash*) reconciliations, by the Torah itself, but implicit (*satum*) ones, by the Sages. Bergman adds, characteristically, "and the Torah requires us to follow their determinations", but he does not state where it does so.

line which divides the two situations: many allegedly Scriptural resolutions are not automatic, but presuppose a certain Rabbinic reading of the text (e.g. the *Sifra* reading in the above given example).

The last of the Thirteen *Midot* is the prototype for the series of rules concerned with harmonization, in that it most clearly depicts the form of reasoning known as **dialectic**, whose pattern is *thesis-antithesis-synthesis*[250]. Its hierarchical position is ambivalent. It should, in a way, have been listed first among them, because it is the one most deeply anchored in the text (*lidon badavar hechadash* has a similar distinction). Before applying any other form of harmonization, we would naturally try to find *within the text itself* some resolution of the perceived conflict. Failing to find an explicit remark directly or indirectly capable of resolving the difficulty, we might then apply more mechanical procedures, especially that of *shelo kheinyano* (since *lelamed*, *shehu kheinyano* and *lidon* relate to perceived redundancies, discrepancies, doubts or interpretative tensions, rather than formal inconsistencies).

However, the Rabbis also, apparently, occasionally appeal to the 13th rule to justify more intuitive reconciliations. In that sense, it is also a last resort, and is well placed in the list. If we wish to explicitly acknowledge such reasoning in cases where no Scriptural passage explicitly, or indirectly through one of the other rules of exegesis (assuming them not to be exhaustive), settles the observed difference between two passages, we would have to add a clause to the 13th rule, to the effect that, 'under those conditions, some credible and consistent reconciling postulate needs to be found'. I think it is fair to say that this added clause has been tacitly accepted and used by all commentators, including R. Ishmael himself. As already said, the pattern of thought involved is natural, and therefore needs no special certification in Biblical contexts, *if properly used*.

The way certain postulates have come to be preferred to others over time, is simply through the process of peer group review; this consisted in debate among experts to ensure the credibility and consistency of such postulates. That kind of process is, in principle, normal and healthy, effectively a process of collective knowledge development, a *garde fou* found in every scientific discipline. Of course, peculiar to Rabbinic thinking (and similar enterprises in other religions), are its historically evident authoritarian aspects.

The above comments are based on the data I have for the 13th rule. However, it may be that, with a larger data base, we could formulate the rule with more precision. Among the possible outcomes or alternative theories are the following:

- It could be that rule 13 is concerned, distinctively, with cases *where the subjects (or antecedents) of the conflicting propositions are one and the same* (or, though different concepts, logically mutual implicants). This is confirmed by the above given two examples; and would distinguish it from rules 8-10, where the major and minor subjects (or antecedents) are subalternatives, and from rule 11, where they are incompatible. In that event, the 13th rule would be defined more precisely, as an argument where 'All S are P1' (major premise), 'All S are P2' (minor premise), 'No

250 With regard to this three-word description of dialectic, the following is worth noting. At first sight, "thesis" and "antithesis" refer to the two ideas in conflict, and "synthesis" to their reconciliation. But we could also say, upon reflection, that "thesis" refers to *both* the ideas in conflict, "antithesis" to the *realization that* they are in conflict, and "synthesis" (as before) to the resolution of the conflict.

P1 is P2' (predicatal premise), whose conclusion consists in denying at least one of those three premises.

- Alternatively, the rule in question may be wider than that in application, and include all cases where the predicates are incompatible (whatever the relation of the subjects). In that event, *shelo kheinyano* would be a special case of *shnei khetuvim hamakhechishim*, and the latter would cover additional situations, such as where the corresponding predicatal premise is denied or where the subjects are identical.
- It is also possible that rule 13 was intended to cover, not merely inconsistencies in the strict sense, but in the wider sense understood by the Rabbis, who look upon any discrepancy or redundancy or source of doubt as calling for a harmonizing response of some sort. This outlook was evident in the rules of *lelamed*, *shehu kheinyano* and *lidon badavar hechadash*. In that event, rule 13 would add to rules 8-11 the function of 'conflict resolution' by alteration of subjectal or predicatal premises. It might similarly embrace the *klalim uphratim* rules and others still[251].

We must also keep in mind that, from a formal point of view, the conclusions recommended by the Rabbis in many of the previous rules are not logically necessary. It follows that they are likely to occasionally lead to inconsistencies, and must be regarded as at best tentative. The resolution of such a derivative inconsistency, merely by retreat from the results of application of an unnecessary *midah*, might have been intended by R. Ishmael as subsumed under the present rule.

Concerning **adduction**, which we saw (in ch. 2) is a Torah-given reasoning process, though one not noticed as such by the Rabbis, nor enshrined by them as a hermeneutic rule. It might be argued that, since adduction is *harmonization between conceptual prediction and empirical findings*, it belongs under Rule 13. However, to there subsume it, we would have to expand R. Ishmael's statement, since the latter relates specifically to textual harmonization - it does not discuss confrontations and reconciliations between the Book, or interpretations thereof (by Rabbis or other people), and external reality. Nevertheless, if the rule is adapted, as above suggested, to allow for harmonization by human (at least, Rabbinic) insight, then it may be considered as also including adductive issues.

251 For instance, the weird *semukhim* argument, offered by Bergman (see footnote 15 of previous chapter), might be regarded as a "resolution of conflict" of sorts (though one of very doubtful validity).

12. THE SINAI CONNECTION.

We shall now look into the issue of the Sinaitic origin of Talmudic/Rabbinic hermeneutics.

1. Verdict on Rabbinic Hermeneutics.

I have no doubt that certain doctrinaire defenders of Judaism will be very upset with me for the devastating deconstruction of Rabbinic hermeneutics in the previous two chapters. But I have to say that my conscience is clear: facts are facts, logic is logic. I did not set off with the intention to discredit Jewish law; quite the opposite, I was hoping to find it valid. However, I resolved to make an objective assessment of the processes involved, unmoved by any considerations but truth, applying my logical know-how to the full. I imagine that God approves, since I believe the Rabbinic characterization of Him as the *God of Truth* literally. I admit that the religious consequences of the results obtained are many and complex, and not all good. But that is none of my business, which is only methodological; I have neither the ability, nor the inclination, to sort out the religious consequences.

> No doubt, too, I will be accused of being "haughty and unlearned", and said to "interpret the teaching according to [my] personal desires", to use the words of R. Simlai[252]. It is true that I have at most a superficial knowledge of Jewish law, having studied the Talmud very little (in large part due to finding its reasoning processes frustrating). However, just as a theoretical physicist, say, need never enter into a laboratory, but may work with the results of experimental research by others; so in my case, I have built up my analysis of Rabbinic reasoning on the basis of data made available by relative experts in the Talmud. *Division of labour* is virtually inevitable in the collective pursuit of knowledge; each worker has his special abilities. My gift - I humbly thank God for it, for I do not see how I might have deserved such a gift - is logic; and I have chosen to apply it to this domain, confident that I would make some valuable contributions (and perhaps sensing a certain naivety and bias in my predecessors).

My method simply consisted in analyzing traditional data, examples and principles put-forward by Judaism itself, with reference to scientific logic. A better method, admittedly, would have been to study the Talmud and other Rabbinic literature directly, and build up a thorough data-base of independent observations of actual thought processes, for evaluation by logic. However, the former approach does not exclude the latter approach from being eventually performed; and the latter approach's desirability does not diminish the value of, or invalidate, the former approach. We can compare this to chemical analysis, when samples of a

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252 Quoted by Bergman (p. 99), with reference to *Yerushalmi* to *Pesachim* 5:3. This statement concerned the teaching of Hagadah to 'Babylonians or people from the South'.

body are taken and their chemical compositions are correctly identified; that conceivably and quite probably other samples, not yet taken, may have other chemistries, does not mean that the samples already analyzed were not properly analyzed. In our case, additionally, the processes we have analyzed are regarded by tradition (rightly or wrongly) as representative[253].

Let us summarize, very briefly, the results of our research into the 13 *Midot*, with a view to distinguishing their natural and artificial aspects. Note first that all the rules suffer to some extent from vagueness and ambiguity, which means that they are bound to be applied with some amount of anarchy.

- ***Qal vachomer***, as we have shown, is a natural and valid form of reasoning. It was reasonably well-understood and competently-practiced by the Rabbis (this is not of course intended as a blank-check statement, a blanket guarantee that all Rabbinic a-fortiori arguments are faultless[254]), without weird embellishments. So, we can say that this first *midah* has essentially no artificial components; though Rabbinic attempts to reserve and regulate use of this *midah* (see further on) must be viewed as artificial add-ons.
- ***Gezerah shavah*** is based on a natural thought-process, comparison and contrast, which applied to textual analysis pursues equations in meaning (synonymy) or wording (homonymy). Analogy is scientifically acceptable, though only insofar as it is controlled by adductive methods, namely ongoing observation of and adaptation to available data. While the Rabbis demonstrated some skill in such inference by analogy, they did not clearly grasp nor fully submit to the checks and balances such reasoning requires. Instead of referring to objective procedures, they tried to reserve and regulate use of this *midah* (again, see further on) by authoritarian means; and moreover, they introduced logically irrelevant provisions, on the "freedom" of the terms or theses involved. Thus, this rule, though it has a considerable natural basis, eventually developed quite a large artificial protuberance, and should not in practice be trusted implicitly.
- Inferences from context, including ***heqesh***, ***semukhim***, ***meinyano*** and ***misofo***, are like arguments by analogy, in that the primitive mind accepts them immediately, just because they appear reasonable. But, upon reflection, we must admit the need for verification procedures; and, ultimately, the only scientific means we have is adduction (repeated testing, and confirmation or elimination, of hypotheses). In any event, proximity is not, even in theory, always significant; so one cannot formulate a hard and fast rule about it. It follows that the Rabbinic attempt to do so is bound to be rather artificial, to the extent that it is presented as more than just a possibility among others.
- ***Binyan av*** is, as we have indicated, a Rabbinic attempt at causal logic. The induction of causes and effects is, of course, a natural and legitimate process, when properly performed, by observing the conjunction or separation of phenomena, tabulating the information and

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253 Though not necessarily exhaustive. For anyone who might want to pursue similar research further, I pass on interesting the information given by *J.E.* that Malbim, in *Ayelet haShachar*, collects "all the hermeneutic rules scattered through the Talmudim and Midrashim," which are reckoned as 613 in number. I did not look into this source, which is likely to be rich. But, however rich it is, we are not exempted by it from looking into the matter with our own eyes and attitudes.

254 In particular, though the *dayo* principle was formulated by Rabbis, some other Rabbis resisted it; as we saw, there were good reasons on both sides, meaning that it is sometimes imperative and sometimes avoidable, so that this theoretical controversy can be excused. However, there were in practice some inexcusable breaches of that principle - inexcusable, within the given context.

looking for behaviour patterns. The Rabbinic attempt at such reasoning was, I am sorry to say, less than brilliant. The Rabbis seem to have grasped the positive aspect of causal reasoning, but apparently could not quite grasp the negative aspect[255]. In practice, they may have often intuited causal relations correctly; but they had difficulty analyzing the relationship theoretically, in words. The outcome of such relative failure, is that *binyan av* efforts must be viewed with suspicion, and classed among the artificial aspects of Rabbinic exegesis.

- The various ***klalim uphratim*** rules (including both R. Ishmael's and R. Akiba's variants) reflect a natural aspect of exegesis, but insofar as they rigidly impose interpretations which have conceivable alternatives, they must be judged as somewhat or occasionally artificial. This regards theory; regarding practice, we can go much further. In many cases, these rules are applied very artificially, being used as mere pretexts for contrived acts which have no real relation to them. If we regard every such false appeal to these principles as an effective instance of them (viewed more largely), then their artificial component is considerably enlarged.
- With regard to the first few rules starting with the phrase ***kol davar shehayah bikhlal veyatsa***, we found their common properties to be their concern with subalternative subjects (or antecedents) with variously opposed predicates (or consequents). Where the predicates are in a parallel relation compared to the subjects, the conclusion generalizes the minor predicate to the major subject (***lelamed oto hadavar***). Where the predicates are in an anti-parallel relation compared to the subjects, the conclusion renders the minor premise exclusive and particularizes the major premise (***lelamed hefekh hadavar***). Where the predicates are incompatible, the conclusion is similar in form to the preceding, though for different reasons; and perhaps additionally, it renders the minor subject and major predicate incompatible (***liton toan acher shelo kheinyano***). With regard to situations where the predicates are otherwise compatible (***liton toan acher shehu kheinyano***), our research has not determined the Rabbinic conclusion and left the issue open.

  Now, in all these cases, *except for* the main conclusions of *shelo kheinyano*, which resolve significant inconsistencies in accord with natural logic, the Rabbinic conclusions are deductively unnecessary: they are at best inductive preferences. However, since they are viewed by the Rabbis, not as tentative hypotheses open to testing, but as laws to be followed come what may, they must be considered as arbitrary and artificial. Furthermore, while we have attempted to determine the exact forms of these laws, the Rabbis themselves are not always clear on this issue, and occasionally misplace examples; this is an additional reason to regard their activities under these rubrics (except, to repeat, for legitimate harmonization) as suspect and artificial.
- The rule ***lidon badavar hechadash***, which the Rabbis were not sure how to distinguish, was found by formal methods with reference to examples to concern movements of individuals from one class to another and back; it was intended by R. Ishmael to raise a question with

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255 I wonder how many of them would pass the "Wason test", which is described as follows (based on Michael Thompson-Noel, in *Financial Times*, 15-16/4/1995): we are shown four cards labeled A, D, 3, 6, and told that cards with a vowel on one side always have an even number on the reverse side; the question is, which cards (at least) should be turned over to check the truth of the foregoing generality? The correct answer is (*WAIT! test yourself before reading on!*): the cards A (to verify that an even number is written on the reverse side) and 3 (to verify that there is *not* a vowel on the reverse side); D and 6 being irrelevant.

regard to corresponding changes in predication. While a literal approach to text would reject such a question, within a more open-minded exegetic system, it seems reasonable enough. Epistemologically, this rule instills exceptional caution in the situations concerned, making inferences conditional on reconfirmation. However, even if we do not classify this rule as overly artificial on theoretical grounds, we must regard some of its alleged applications with considerable suspicion, in view of the evidence that the Rabbis are unclear about it.

- Lastly, the rule ***shnei khetuvim hamakhechishim***, viewed as a wide-ranging harmonization principle, may be classed as an important aspect of natural logic. However, this essential validity does not automatically justify every dialectical act found in Rabbinic literature; quite often, Rabbinic interventions under this guise are rather forced. Furthermore, this rule may not, in fact, have been intended by R. Ishmael to cover every conflict resolution (or at least every conflict not resolved by preceding rules); its scope may have been intended to be premises with a common subject (or antecedent) and variously opposed predicates (or consequents). Such uncertainties in definition call for caution, too. In sum, this rule, as with most of the previous, in practice if not in theory, contains artificial factors.

This summary makes clear that *we cannot define in one sentence the distinctive features of Rabbinic 'logic'*, i.e. those aspects of it which are not granted universal validity by natural logic. Broadly speaking, **the Rabbis developed distinct modes of thought due to lack of formal tools, consequent vagueness in theoretical definitions, and resulting uncertainties in practical applications**. Their natural logic was gradually thickened by an agglutination of diverse artificial elements, which became more and more difficult to sort out, and more and more imposing. Being manifestly unjustifiable by natural means, these extra elements had to be defended by intimidation, with appeal to Divine sanction and the authority of Tradition.

The verdict on most of Rabbinic hermeneutics, emerging from our precise logical analysis has to be, crudely put, *thumbs-down*[256]. In the last analysis, **whatever it is, it is not a teaching of pure logic**[257]. There are, to be sure, many aspects of it which are perfectly natural and logical[258]. But certain distinctive aspects of it, which we may refer to as peculiarly Judaic 'logic', must be admitted to be, for the most part, either non-sequiturs or antinomial; in all evidence, products of very muddled thinking. We could, with an effort, make allowance for many of the latter processes, if they were viewed as *ab-initio* tentative hypotheses, inductive

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256 I was myself so shocked by this surprising negative verdict that I renamed the book. Originally, I had intended to call it *Jewish Logic*, out of pride in my people's early progress in certain aspects of logic, such as adduction, a-fortiori and dialectic. But after completing analysis of all the hermeneutic principles, it became clear that I could only call the book *Judaic Logic*!

257 I guess I am indulging in a bit of irony here. I mean, either Rabbinic hermeneutics is intended as a teaching of logic, in which case it is pseudo-logic; or it is not so intended, in which case it is misleading to present (as often done) Rabbinic arguments as processes of *reasoning* which lead to a conclusion: every argument must be viewed as a mere *decree*. But anyhow, we cannot have it both ways. It is significant that *midot* is translated as 'principles of logic' in many bilingual Jewish prayer books; Lewittes, p. 66, n. 61, informs us that this is a decision of the Rabbinical Council.

258 This proves nothing in itself, since (as Rabbis themselves have said) *there is always a kernel of truth in a false statement*. It has to be so: without some reality to lean on, illusion cannot exist at all; no one would at all believe a false statement if it did not contain some truth. The issue is always to separate the husk of falsehood, and weigh it against the kernel of truth.

first-preferences, subject to further confirmation or at least to non-rejection by the remaining body of knowledge. But they are traditionally presented as irrevocable certainties, quasi-deductive processes, not subject to critical review (at least, without a special license granted to a privileged few). So we must evaluate them in that given framework.

> Whatever traditional claims, according to logic it is virtually inevitable that, in a large body of information, the adoption of unnecessary postulates and the arbitrary contradiction of given data will result in hidden, if not obvious, inconsistencies. All the more so, where the proof-text itself is rather ambiguous, disorderly and confusing, as is the Torah, so that one must proceed very carefully. To arrive at a consistent result, using artificial processes like R. Ishmael's rules, it is essential to have a certain leeway, a possibility to retreat as well as advance. If each rule has to be applied rigidly and irreversibly, the end-result is bound to be untenable, and only capable of being sustained by lies and self-delusion. Even a simple, natural generalization of some Scriptural statement, through say a *lelamed oto hadavar*, may turn out to be in conflict with some other textual statement; how much more so with a complex, twisted paralogism, like say a *lelamed hefekh hadavar*. In such cases, we must either retract or modify the text: on what basis we are allowed to do the latter, without absolute logical need, I have no idea; it would seem much more justifiable to do the former. Surely, our primary axiom must be that the Torah is more reliable than Rabbinic constructs.

The only conceivable defense against the results of the present research is to say that the rules of Rabbinic exegesis constitute ***a secret code***, by which instructions in the Torah are to be transformed into valid legal statements. This thesis suggests that God deliberately wrote the Torah in a misleading way, not wanting everyone to have access to His real intentions, but only a select few (the Jewish Rabbis), to whom *a conversion table*, the hermeneutic principles, was specially revealed for decoding purposes. Thus, according to this idea, God said (in effect) "when, for instance, I assign an implying predicate to a subordinate subject in the Torah, you must contradict the Torah statement where I assigned the implied predicate to the subaltern subject (*lelamed hefekh hadavar*)". Put in clear terms, this is effectively the defense proposed by the orthodox establishment. They put it more romantically, with reference to "allusions and hidden mysteries" which "defy literal interpretation"[259], but that is what they mean.

Thus, *in that view, the Torah can, and often does, mean more or less than what it says*. For this is what happens: when, without logical necessity, the Rabbis generalize a particular statement or read a statement exclusively[260], they ***add*** to the law; and when, likewise, they particularize a general statement, they ***subtract*** from the law. This thesis is not inconceivable, but it is rather far-fetched and difficult to believe. One may well wonder why God would want to engage in such shenanigans, and not speak clearly and straightly. If His purpose was to illuminate humankind in general, and the Jewish people in particular, with a perfect law, full of Divine wisdom and love, justice and mercy, purity and spirituality, why not say just what He means? Why would He need to mask His true intentions, and give the key to them only to the Rabbis?[261]

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259 I quote Bergman again (p. 99), who uses this language with reference to Hagadic statements of the Rabbis; but I have seen similar language used with reference to the Torah.

260 Crediting the rest of, or the negation of, the subject with the negation of the predicate, beyond the license given by eductive logic.

261 I am not a crypto-Karaite, nor belong to any other sect or religion; this is a candid and honest question by a 'normal Jew', who practices *tant bien que mal* the religion of his forefathers, so far. Another question worth asking is: why would God not wish to teach us logic and orderly thinking; what advantage would He have in confusing and epistemologically incapacitating people? As far as I can see, only a clerical class can gain from such assumptions.

All this concerns, note well, especially situations which do *not* logically entail or call for the Rabbinic responses. In situations where logic clearly demands a certain inference or resolution of conflict, there is no need of special revelations; everyone is (more or less) in principle naturally endowed with the required intellectual means. Rabbinic hermeneutics, as a Divinely-granted privilege, come into play, essentially, wherever logic is faced with a *problematic* issue, because Scripture, taken as a whole, does not answer some question, but leaves a gap. The gap may be an indefinite particular proposition: should we read it as general or contingent? In natural knowledge, the preferred course[262] would be generalization. Alternatively, the gap may consist in total silence about some subject, without even a guiding particular proposition. In natural ethics, we might opt for permissiveness, or at best a conventional law.

When dealing with a presumably Divinely *revealed* database, such as the Torah, instead of knowledge naturally developed in the minds of human beings, scientific logic cannot predict with certainty what the intent of the Law-Giver was, in the event of gaps. It is, arguably, more likely that an indefinite particular proposition be read as contingent, and it is conceivable that more radical gaps are to be filled by the decision of Divinely-appointed judges (as Deut. 17:8-13 suggests). The latter possibility would justify *additions* to the law (pronouncing an indefinite particular to be exclusive, or generalizing it, or formulating a completely new provision, are all references to previously unaddressed instances); but it would not justify *subtractions* from the law (other than particularizations called for by manifest contradictions, which cannot be resolved otherwise).

Yet the Torah *explicitly* frowns on additions (*tosafot*) to, as well as subtractions (*geronot*) from, the Written Law, in passages like the following[263]:

> ***Ye shall not add unto the word which I command you, neither shall ye diminish from it, that ye may keep the commandments of the Lord*** (Deut. 4:2).
>
> ***All this word which I command you, that shall ye observe to do; thou shalt not add thereto, nor diminish from it*** (Deut. 13:1).

Such passages could be interpreted literally, to imply that even where gaps are found, no human legislator or legislative body may presume to try and fill them. The very human, and particularly Rabbinic, tendency to legislate about almost everything would seem to be illegal[264]. In this perspective, when the written Divine law is obscure, albeit all efforts of pure

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262 Based on factorial induction theory; see my work ***Future Logic***, again.

263 These two sentences, of course (being from Deuteronomy), are spoken by Moses. Our basic premise is that he utters them with full authority from God, as a mere mouthpiece, rather than as the very first Rabbi. Another viewpoint entirely, is to regard Deut. as the first Rabbinic work, i.e. the first transcription of oral law. (Indeed, reading this work, I imagine Moses, now the aging leader of a well-established new order, sitting in his tent, dictating as they occur to him words of wisdom to his personal secretary. The image is suggested by the casual style, the digressions, the repetitions, the scattered subject-matter....) In any case, it could be countered that 'the word' Moses refers to, which may not be modified, includes not only the written law, but also the oral law. However, how can adherence to unwritten law be ensured? What, in such case, would addition or subtraction constitute? How would the boundaries be defined?

264 Lewittes (p. 90), with reference to these two passages of Deut., comments: "Nevertheless, the masters of Jewish Law, in particular the Sages of the Talmud, did not hesitate to add new legislation to

logic made to clarify it, there is effectively no Divine law (on the subject at hand). The appointment of judges is then merely intended for the *application* of Divine law; that is, to decide in each case whether Divine law has been broken, or in whose favour Divine law leans, and impose the sentence, if any, required by those same laws. There is no delegation of powers to construct legislation with nearly Divine authority. All non-Divine legislation is subject to natural ethics or human convention, and thus possibly open to variation under appropriate circumstances.

In any case, the 'secret code' rationale is very fragile. It was intended, remember, as a last resort explanation of ***the illogic of the Midot*** (as above exposed). But this only holds together at best temporarily; since, as of the moment the code is broken and ceases to be secret, as done in this volume, the whole argument falls apart. One can, only so long as a mystery remains, argue that God wrote the Torah down differently than He intended it to be read, giving exclusively to Moses and his successors (the Rabbis) a codebook (the *Midot*) to translate His intentions. But, once the implied equations are made transparent and accessible to all, the idea that God expresses Himself in such uselessly tortuous ways becomes ridiculous.

> All esoteric claims are equally vain in the long run. Thus, similarly: the Oral Law as a whole stops to be a special privilege as soon as it is written down (as in Mishnah and all subsequent Halakhic works), and so one may well wonder why it was not handed down to us in writing to start with.

It is thus easy to suppose that, from the first appearance of the *midot* (meaning near Talmudic times), they were simply the Jewish equivalent of Sophist argumentation[265], products of the logical incompetence and intellectual dishonesty of the speakers, and of the relative ignorance and gullibility of their listeners. The fact is that the artificial aspects of Rabbinic hermeneutics give enough of an illusion of being complex logical arguments, to bamboozle into intellectual submission, anyone who feels unselfconfident in his or her logical abilities and/or who for emotional reasons is all too willing to be persuaded. The 'secret code' rationale plays only a supporting role, as eventual backup in debates with philosophers. In everyday practice, Rabbinic hermeneutics 'work', i.e. they are 'convincing', because the defense against them demands a logical lucidity and expertise most people lack (be they Rabbis or laypersons).

> The power of persuasion of the *Midot* was, of course, greater in the past than it is today; though some people, even educated people, continue to be moved by them. One non-negligible reason for the continuing credibility, is the desire of Jews to hook up with the genuine, ages-old tradition of Judaism. They are not looking for absolute truth; they are looking for roots and wish to belong. They are willing to force their minds into the unnatural thought-processes of the Rabbis, because they regard their own current thought processes as equally artificially induced, by modern society and its media. But the pursuit of happiness must not be confused with that of truth.

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the corpus of Jewish Law. They interpreted the Biblical injunction quoted above to apply to each mitzvah in itself; i.e. not to add to a mitzvah a feature not prescribed for it by the Torah.... Furthermore, it was not considered a violation of this injunction if the additional legislation was clearly denoted as Rabbinic and not Biblical in origin." However, that explanation does not sincerely solve the problem; many laws *in fact* fall outside its scope one way or the other. It is just a smoke-screen: if we consider the final legislation point by point, we undeniably find many additions and subtractions.

265 Historically, we should perhaps rather make a comparison to the Stoic preachers of Roman times.

2. Artificial Blocks to Natural Development of the Law.

The existence of an oral legal tradition is suggested within the (written) Torah in various passages, already mentioned. It is perfectly reasonable, as the story in Ex. 18:13-26 makes clear: following the advice of Yitro, an overburdened Moshe appointed judges to apply (and therefore to some extent interpret) the law in his place, reserving for himself only the most difficult cases. Effectively, Moshe became a theoretician, one in communication with God, and left most of the practical work to others. This would have had to be done sooner or later, to ensure the perpetuation of the new legal system after his decease. With the departure of Moshe, and eventually the disappearance of prophecy, the reference to Divine decision in difficult cases stopped, and the law could only develop with reference to pre-established parameters.

But while the above general proposition is justified and reasonable, it does not automatically follow that every particular claim of tradition is equally well-supported. Concentrating more specifically on the hermeneutic principles, it seems very unlikely that they were entirely transmitted from Sinai. The suggestion that the game rules of Talmudic discourse were known all along is especially difficult to swallow. What is empirically evident, rather, in Mishnah and Gemara (and thereafter), is the gradual development of game rules, by trial and error, through disputes and compromises between the players. We encounter a lot of evidence to that effect throughout the present work.

> It is worth quoting the *Jewish Encyclopedia* in this regard: "The Talmud itself gives no information concerning the origin of the middot, although the Gaonim regarded them as Sinaitic...This can only be correct if the expression [*Halakhah leMoshe miSinai*] means nothing more than "very old," as in the case of many Talmudic passages[266]. It is decidedly erroneous, however, to take this expression literally and to consider the middot as traditional from the time of Moses on Sinai."

At first glance, the proposed rules would seem quite conceivably to be of Mosaic origin, in some form or other. But when we look more closely at them and see:

- *that there are disputes concerning their validity and conflicting lists are offered,*
- *that the lists are incomplete and imperfectly organized,*
- *and most importantly that there are disagreements in the interpretations of the individual principles themselves,*
- *and many exceptions and extensions are proposed for them...*

- we must be extremely careful, especially since at issue are *methodological* guidelines for interpreting the Divine law. If (or to the extent that) these guidelines are at all in doubt, then all work done with them becomes open to doubt, too.

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266 It is interesting to note that the expression *Halakhah leMoshe miSinai* is acknowledged by no less an authority than the Rosh to be not always literally true, according to Lewittes p. 142.

Ethical laws, whether relating to religious ritual, personal and social morality, or juridical and political matters, *can* logically be optional or conventional, and thus have 'seventy facets', in the sense that *there may be many means which achieve the same goal equally well*, and the factor of Rabbinic decision may reflect the necessity in such contexts of a common and uniform choice, a consensus. With regard to hermeneutics, it is conceivable that God wrote the Torah is such ways that a number of intellectual connections are possible from one batch of data, each to one of the optional ethical laws; and that the limitations set by tradition to such thought-processes represent the conventional aspect of religious law and logic. However, this measure of leeway and control in interpretation is only a small fraction of the world of exegesis, which remains bound by a great many absolute rules of logic.

In relation to the rules of natural logic there are no ifs and buts. Rabbis cannot *choose to ignore* such rules, no more than they can *choose to follow* them; they are universal truths, irrefragable realities, for which no 'seventy facets' hypothesis can be postulated. ***Rabbinic 'logic' cannot permit what natural logic forbids, nor exempt from what it demands***. These remarks, of course, principally concern deductive logic; with regard to inductive logic, or epagogic, preemptive rulings inhibiting directions of thought which might otherwise eventually be taken are not totally excluded. The Rabbis might conceivably, as just implied, with reference to Torah text, forbid or make imperative an interpretative process which is *contingent* according to the science of logic. They would have to claim Divine sanction, of course - something difficult to prove or disprove, and something which anyone else could just as well eventually claim, if claims are blindly accepted. But in any case, their credibility depends on respect for the objective boundaries set by natural logic.

Nevertheless, the Rabbis have made efforts to both *reserve* and *regulate* use of the hermeneutic principles, occasionally in ways which seem unjustified or unjustifiable. Hints of this tendency may be found in the Talmud[267], but it has developed greatly in post-Talmudic literature. We quote Bergman[268], first with reference to Biblical interpretation (for Halakhic purposes): "**we are no longer empowered to interpret the Written Torah using any of the thirteen rules of exegesis** (*Maharik Shoresh* 139; *Ra'ah* to *Ketubos* cited in *Yad Malachi* 144)"; and similarly, with reference to interpretation of the Talmud, giving Rashi on *Shabbat* 132a as his reference: "**the Oral Law cannot be interpreted with any of the thirteen hermeneutic rules**".

The first of these sentences reserves use of the hermeneutic principles for the interpretation of Scripture to the Sages of the Talmud exclusively; the second sentence prevents their use for the interpretation of Talmudic and other texts by anyone. Logically, both sentences presume that such legislation is objectively possible, as if the modes of thought involved have no formal necessity! But the truth is that no human can legislate laws of logic

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267 We may as an example point to the sentence *ain adam din gezerah shavah meatsmo*, translated by *J.E.* as "no one may draw a conclusion from analogy upon his own authority" with reference to *Pes*. 66a and *Niddah* 19b. *J.E.* explains (p. 32) that this canon was formulated to prevent contradictions emerging from unrestricted use of *gezerah shavah* argument, and suggests that the decision on use in each case was not (as Rashi claimed) necessarily based on Sinai tradition, but on Rabbinic consensus. I would suggest that the purpose of this canon was not immutability, nor even collective assent, but to ensure that an individual Rabbi proposing a *gezerah shavah* did so with consideration for the full context of knowledge (an inexpert individual could easily ignore or forget relevant data); the collective assent and immutability would be consequences of such proper inductive thinking, which convinces everyone for all time.

268 All quotations from Bergman, here, are from ch. 13 (pp. 120-156).

out of existence, and exegesis is largely composed of such natural laws. So, certainly, at least the natural aspects of exegesis are beyond the jurisdiction of Rabbis to reserve; no Divine authority can be claimed by them: the proof that God wanted the laws of logic (like those of mathematics, physics, etc.) is that He created them as part of nature. As to the artificial aspects, they are welcome to them; that is, *since they are illogical, the less they are used by anyone, the better*.

What is interesting, in these general limits, and more specific equivalents, is that the authorities quoted by Bergman are *post*-Talmudic, and furthermore that he repeatedly reports *controversies* among them with regard to the truth, or precise formulation of, such limiting principles[269].

> To obtain a proper perspective on the issue of tradition, we must always keep in mind the various time spans involved. Fundamentalist students of Jewish law tend to ignore the time factor, and behave in their thinking as if all the players were contemporaries. Effectively, they claim to know with certainty that during a first span of over a millennium, there was perfect oral transmission of the Sinai tradition without loss or distortion of data and without innovations. Then, suddenly more endangered[270] than ever before, during half a millennium, it was all (or almost all) put into writing; and those who performed the job had special exegetic powers and rights, which passed away with them. Finally, hundreds and hundreds of years later, we find authorities writing down 'oral traditions' which, apparently, no-one in the interim (even though there was a well-developed culture of written law since the Talmud) had found worthy of mention. This transmission scenario, proposed by the Rabbis, is not credible.

It should be noticed that there is another inherent logical difficulty in the proposed limit on inference from the Written Torah. Mishnaic discussions started about *1200 years* after the Sinai Revelation; the Talmud as a whole was completed some *600 years* later; the classical commentators were active *several hundred years* after that. It is difficult to conceive that hermeneutic principles were delivered at Sinai with a built-in 'self-destruct' clause, permitting Rabbinic authorities living specifically between 1200 and 1800 years later to use certain methods of inference, and forbidding those living after that period from using them. How would such a clause have been formulated? Did Moses say: "In about 1800 years, after some 600 years of writing down of the Oral Torah, when the Talmud is closed, you will no longer be allowed to infer law from the Written Torah"? There is no evidence of such a tradition; it is all too obvious that the limitation was a *non*-Traditional phenomenon, merely the work of certain rigid-minded individuals.

With regard to the proposed limit on inference from the Oral Law, we might try to justify it by saying that whereas the Written Torah is a Divinely-dictated document, the Oral

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269 Bergman, needless to say, draws no negative conclusions from these or any other issues; all criticism expressed here is the author's own.

270 Danger is implied by the persecution of those who remember the oral tradition; they may all be killed off and the tradition thus be forgotten. If *any part* of an oral tradition is known to have been forgotten, then surely *all* the remaining parts of it become suspect, for the missing parts may be crucial in making such or such inference, and without them the entire law becomes actually or possibly distorted - permitting the forbidden, forbidding the permitted, and so forth. For this reason, it cannot be suggested that some parts of our tradition were actually lost (as, I seem to recall, some passages of the Talmud suggest).

Torah (written down as the Talmud) is a human product[271]. But, upon reflection, such an argument has its difficulties, too. If the Oral Torah was, as per orthodox claims, also Divinely given, then the Talmud should be a virtually verbatim transcript of it and could assumably also be used as a source of inference using similar processes. To deny such perfection to the Talmud would be to put in doubt its continuity with the Sinaitic oral tradition! And even if it is admitted that not all the laws are Divinely given, it is claimed that they are, if only indirectly, Divinely sanctioned; in such case, too, inference should be possible.

It should, in any case, be noted that the Rabbis of the Talmud, in discussing each other's theses, and their successors, in discussing the Talmud and each other's theses, do in fact use at least the natural aspects of the hermeneutic principles. When a Rabbi, for instances, *as often happens*, constructs a *qal vachomer* argument from another's statements, or understands another's thesis as *davqa*, or tries to resolve a conflict between two Rabbinic theses, he is undeniably using exegetic methods. It cannot therefore be claimed that the theoretical interdiction of such methods in oral law is obeyed by the authorities in practice. The interdiction is obviously intended specifically for laypersons, to prevent them from putting Rabbinic decisions in question.

The truth of the matter, then, is that the *natural* thought-processes, through which we all understand *any* documentary or oral legal exposé, cannot be avoided or controlled, whether in the case of Torah or Talmud or later Rabbinic law. The proposed restrictions can only conceivably concern additional, *artificial* clauses: but, as we have just argued, such clauses, whether assumed to be Divinely inspired or the inventions of humans, can hardly be formulated with a time limit, anyway.

> How such artificial clauses have in fact developed over time is suggested in the *Jewish Encyclopedia* article on Talmud hermeneutics. It would seem that, for example, the Rabbis might initially make a *gezerah shavah* between two instances of a term, without taking into consideration other manifestations of the same term in the Torah. Later, *in order to inhibit the same inference from being extended to such other cases, without however abandoning the initial inference*, an artificial rule had to be constructed, individually designating as "traditionally-accepted" the case(s) to which such inference was to be limited.
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> A natural approach would have required either extending the same inference to all other cases, or at least finding for the desired case some inner distinction justifying its special treatment, or abandoning the initial inference. But the Rabbis, aware of the inconsistencies likely to arise from free extension, and not finding any convincing distinguishing character in the accepted cases, and ideologically reluctant to revise previous judgments, opted for institution of an arbitrary rule, defining allowable cases *indicatively* (i.e. merely saying "this, but not that"). This is effectively an attempt to *rig* exegetic methods, so they arrive at preferred results. To err is human and natural; but to institutionalize error is to lie.

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[271] Funnily enough, some Rabbis seem to consider the Divine as more accidental, less purposeful, than the human, judging by a comment in Bergman, p. 135, according to which: "*R' Betzalel Ranshburg...* quoting *Ravan,* maintains that R' Yehudah interpreted *semuchim* only in *Deuteronomy*. This is because the other four books of the Pentateuch were dictated by the Almighty and were not recorded in any particular order, whereas Moses arranged the sections of Deuteronomy in a certain sequence for the purpose of interpreting them." It seems to me that such a position, puts in doubt the R. Akiba principle that the order of things in the Torah is intentional, on which principle many contextual inferences are made, and furthermore, and more importantly, it puts in doubt the Divinity of the laws found in Deuteronomy but not in the preceding four books.

Two broader assumptions should be mentioned in this context: that (i) **the Torah laws were intended by God as eternal**, and that (ii) **the laws derived from the Torah by the religious authorities are immutable**[272]. These canons have, of course, been of great significance to the Jewish law system, removing from it all temporal considerations, all possibility of change. They did not, however, need to be brought up repeatedly in legal debates, being so universally accepted. Various remarks may be made concerning them.

The first canon seems very reasonable, at first sight. But, upon reflection, it stems from an excessive rationalism; for it is not *inconceivable* that God intended certain laws with reference to specific socio-cultural contexts, allowing for their evolution with historical change. Indeed, the Torah seems to allow for change in God's legislation (compare before and after the Deluge, and before and after Sinai); also, some Divine instructions were punctual (for instance, many relating to the first Passover). This only means that Divine decrees are permanent *until, if ever, God Himself repeals, replaces or modifies them*. Needless to say, to acknowledge this as a possibility, is not to recognize every specific claim that this in fact occurred, such as the Christian and Moslem claims.

Furthermore, there are instances where Torah law was temporarily suspended, which the religious authorities concede (for instance, the prophet Eliahu's animal sacrifice on Mt.-Carmel, against the law which legitimates only the Temple for such rituals). Moreover, the religious authorities have occasionally adapted the law, more constantly, to changed historical conditions (for instances, the laws relating to release from debts and to payment of interest). They argued that the adaptations were foreseen by the original law, in the way of loopholes in it; but we must regard the matter phenomenologically: there was effective change in the accepted legal mores. Also, some commentators have seemingly suggested the relativism of some laws (I am thinking of Maimonides, who suggested that animal sacrifice was *passé*).

The second canon seemed to the Rabbis to be a natural extension of the first. Given the Rabbi's claim of Divinely delegated authority (based on certain statements in the Torah, which we have seen); their belief that God granted many of them special powers of insight (prophecy, the holy spirit, great wisdom); as well as their great trust in their powers of reasoning, due to the assumption that their inferences were overwhelmingly deductive, rather than inductive - it was inevitable that they would regard the whole Halakhah (that is, all interpretations of the Torah developed collectively over time by the Rabbis) as immutable once established. If Torah statements were eternal, and the inferences therefrom were technically faultless operations, then, surely (they thought), the results they obtained must be incontrovertible and final.

However (as often demonstrated in the present work) though Rabbinic reasoning was frequently powerful, it was neither omniscient nor infallible. The second canon does not logically follow from the first. Even if we grant the full intention of the first, we need not automatically grant the full intention of the second. Seeing that it concerns *humans*, all we can say with surety is that *where* their arguments are logically tenable and convincing, and *so long as* they remain so, in changing objective circumstances and knowledge context, we must admit them. But if good reason is found, within the letter and spirit of Torah law, changes in

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272 Note that I refer here to "laws derived from the Torah by the Rabbis" in a broad sense, including any legislation not explicitly obvious in the Torah. The tradition calls "Rabbinic law" only a small segment of the Halakhah, namely *taqanot* (if I remember rightly); but I am including here all oral traditions and interpretations.

derivative law ought to be admitted by the Rabbis. It is absurd, contrary to reason, to lock the door and throw away the key.

> In any case, let us note that, in its extension to the whole Halakhah, the concept of immutability has introduced great technical complications in the process of legislation. I refer to the travail of orthodoxy, the ever-narrowing room for maneuver of legislators as the volume of established commentary grows. This phenomenon (and its devastating effects on the people to whom the law is addressed) is not peculiar to the Jewish religion: a similar rigidity may be observed in many periods and sects of the Christian and Moslem religions. But we may contrast it to secular law within a democracy (the *état de droit*). In the latter law-systems[273], even constitutional laws may be changed, according to the surrounding conditions and current understanding of things. Furthermore, these display certain characteristics absent or less prominent in the former; for instances, constitutional law overrides divergent ordinary legislation, newer laws or provisions may override divergent older laws or provisions which were not explicitly repealed. As a consequence, the law can evolve (sometimes, admittedly, in sorry ways; but often, surely, for the good).

The Rabbinic restrictions on use of the hermeneutic rules (to certain persons, in certain domains) do not affect the actual operation of these rules where the Rabbis allow them to be used. On the other hand, there are general principles which affect exegesis in action, causing many of the rules to produce results they would not otherwise produce. I am thinking especially of the **principle of economy**, as it might be called, which is attributed to R. Akiba, and which might be stated, broadly-speaking, as: **in the Torah, no choice or placement of word(s) is accidental and no repetition of word(s) is superfluous**[274]. This viewpoint derives from a rationalistic thought that God would not, in so important a document as the Torah, His main verbal link with humanity, misuse, misplace, or waste a single word, phrase or sentence.

Note, however, that the principle of economy was somewhat mitigated by a principle that "**there is no early and late in the Torah**" (*ain muqdam umeuchar baTorah*[275]), which allowed commentators to occasionally chronologically reorder events narrated in the Torah. However, this has had a lesser effect, if any, on Halakhah, since the sequence in which laws were given does not affect their contents or relative strength.

> Incidentally, while there is no doubt that the principle of economy has been used by the Rabbis with reference to a great many of the words and word-placements, it has never so far as I know been confirmed with reference to all of them. No one seems to have made a systematic research in all possible sources, to see if, indeed, *every* item in the Torah subsumed by this principle has been accounted for by the Rabbis, even conjecturally; or to count the proportion accounted for.

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273 The contrasts to secular law made here are not my own insights. I found them in Abitbol, in his discussion of the 13th *midah*. He also mentions that conflicts between divergent laws may be resolved with reference to widely admitted general principles. Note that we may regard Torah law as having constitutional status, and Rabbinic derivations of law as equivalent to ordinary legislation, with the newer superseding the older because it has taken it into account. However, the contrast remains, despite such analogies, because we cannot in principle change Torah law, nor in practice change Rabbinic derivations.

274 A fuller statement of this principle would also attach significance to: a pleonasm (i.e. a grammatically redundant word); the absence of a word present in a similar statement elsewhere; a redundant phrase or sentence; an extra or missing letter in a word.

275 *Pes*. 6b, quoted by *Enc. Jud.* p. 371.

In this deterministic perspective, there are inferences to be drawn from every verbal peculiarity in the Torah; and as we have seen it had a strong effect on Rabbinic exegesis, often causing very far-out 'inferences' to be made. It must be stressed that, as a theoretical position, this was not universally accepted; R. Ishmael favoured a more poetic approach, saying that "**the Torah speaks in the language of men**" (*Sifre* on Num. 112, quoted by *J.E.*). It should be noted, however, that (as we have seen) in actual practice, R. Ishmael very often tacitly adhered to the same mode of thought as R. Akiba. One might reflect that it is very hard for human beings to avoid rationalism, even when they may try to!

If the principle of economy has been contested by high authorities of Mishnaic times, it surely cannot be claimed to be absolute, Divinely given and traditionally irreproachable. Even if it was in practice used more often than ignored, it must at best be viewed as an ex post facto summary, a heuristic principle, rather than as a guiding, hermeneutic principle. A serious problem with it, is the difficulty of defining it precisely, in a way which ensures that it operates in formally predictable ways. It cannot be expressed as a hard and fast rule, echoing the law of identity, that the Torah 'means what it says', for a literal and rigid interpretation of this document leads to contradictions (and, anyhow, the Rabbis do not always favour literal interpretation, as we have seen).

Furthermore, the 'language of men' hypothesis, which conceives a poetic license for God, according to which His choice of words may vary, and He may repeat words, and He may use words in surprising positions, without thereby necessarily intending to affect the law - is not unreasonable. Such liberties of style do not have to signify a lack of order in God's thinking, but could be assigned to other motives, like beauty, emphasis and narrative requirements, reflecting also the intellectual limits and emotional needs of the human addressees of the Divine message. Therefore, the economy principle is not the only logically acceptable position.

The truth is, I daresay, somewhere in between functionalism and art. If we understand R. Ishmael's postulate as noncommittal, i.e. as merely a denial of R. Akiba's hard and fast rule, then we need not seek further for a golden mean: it is it. We can then say that the correct approach, in view of the lack of consensus, on so basic an issue, among top level carriers of tradition, and in view of the technical difficulty of defining the principle of economy in such a way that it can be applied without controversy, is to rely on natural, generic logic. That is, to judge each situation on its merits, using the whole palette of inductive and deductive procedures logic makes available to us, flexibly and unassumingly.

> It may seem paradoxical that while, in their theoretical attitudes, R. Akiba seems more rationalistic and R. Ishmael more poetic - in their practice of exegesis, as pointed out by *Enc. Jud.*, the former's method is "less confined", more logically permissive, the latter's "more restrictive", more logically demanding. As I see it, R. Akiba uses the seemingly strict economy principle as an excuse for almost any flights of fancy; whereas R. Ishmael's language-of-men hypothesis and resultant caution in action are evidence of a deeper empiricism and rationalism.

We must, in any case, stress that *a distinction must be drawn between the general principles formulated by R. Akiba and R. Ishmael, and the particular inferences claimed to have been made on these bases (by these same Rabbis or others)*. Just because someone claims that in performing a certain 'inference' they are applying this or that accepted principle, does not certify that the principle was indeed the logical basis of the 'inference'. There is a big

difference between justification and rationalization. There might be a loose, analogical relation between the pretexted principle and the alleged application, yet not in fact be a strict logical relation. Blah-blah is often a smoke-screen.

Another canon, in the same rationalistic vein, that affected exegesis was that **each unit of information in the Torah can only serve for one inference**. It must be stressed that this notion is very peculiar to Judaic logic. Generic logic has no such restriction: a premise *can* be used repeatedly, in any number of arguments, without being thereby disqualified. Moreover, a premise *should* be re-used as often as possible, wherever its terms or theses make such use possible, to ensure its consistency and integration with the whole body of one's knowledge. I imagine that the Rabbis' idea was conceived as a corollary of the principle of economy, a sort of extension from the statics to the dynamics of Torah study. But I see no justification for it whatsoever, and to repeat it has no basis in formal logic.[276]

Yet another restrictive canon of this sort, proposed by R. Ishmael, was that the **hermeneutic principles mayn't constitute chains of arguments** (sorites), such that the conclusion of one is used as a premise of the next. This canon was not accepted by R. Akiba, who considered that one may "learn from a matter itself derived from Scripture" (*lamed min halamed*).[277] As may be expected, I would in this case favour R. Ishmael's restriction, with respect to the artificial outcomes of the hermeneutic principles; though defend R. Akiba's position, with respect to the natural outcomes of exegesis. The artificial parts are to be avoided as much as possible; the natural logic parts cannot be interdicted.

3. How "Tradition" Keeps Growing.

In the pursuit of objective truth in religious matters, or as near to it as we can get, it is important, as we have seen, to first of all control one's mental attitudes, and avoiding all psychological and social pressures, concentrate on the facts and logic of the case at hand. Additionally, one should be aware of various pitfalls, some of which may be found in all domains and some of which are more likely to be found in the particular domain of religious thought.

276 In fact, the Rabbis do, if only implicitly, re-use premises. Examples may be found in our analysis of "*kol davar shehayah bikhlal*" exegesis, where each of the four premises (major, minor, subjectal and predicatal) is combined with the remaining three to elicit information and check for consistency.

277 See *Enc. Jud.* p. 371, which refers to *Zev.* 57a. Bergman also mentions R. Ishmael's principle (though not R. Akiba's), though he seems to limit it to laws concerning the holy offerings; but he adds that "several distinctions may be made" in this regard and refers us to *Zev.* 50b. (Note incidentally that if R. Ishmael's position here is accepted, so that all the premises of hermeneutic arguments must be obtained directly from within the text itself, it follows a-fortiori that his 13th rule cannot be interpreted as allowing the resolution of conflicts to come from outside Scripture!)

We realize, today, the extent to which imagination plays a role in scientific thought. Mach, Einstein are among those who have stressed this fact. Knowledge depends on hypothesis-building and verification. To build hypotheses means *to imagine* new ideas, by means of the images and echoes of past experiences and rational insights, whose concrete and abstract elements are combined and reshuffled in ways never before tried. Our imaginations are *variously extended and limited*. The same person, under different conditions, and especially in different knowledge-contexts, has varying facilities and constraints of imagination. Different persons, coexisting in a historical epoch and culture, have different facilities and constraints; likewise, and all the more so, persons in different times or milieux.

All this is as true in mathematics as in physics or biology: ***our ability to conceive of explanations or solutions always depends on our imaginativeness***, which is a function of the faculty of imagination as such (the factors in our brain which make possible the projection of novel structures and permutations), as well as of our perceptiveness, the intelligence of our insights and our acquired context of information (which together provide the elements manipulated by the imagination). Effort and perseverance play a role, too, of course. If this is true in the 'exact' sciences, it is all the more so in disciplines like history, where facts are much harder to come by, being relatively unique and non-reproducible, and the share of postulates is consequently much greater. Likewise, as we shall presently show in more detail, *religious thought depends on the imaginativeness of those who engage in it.*

If we look at religion, not only the Jewish religion but also the other major religions, we see certain recurring patterns of behavior. One of the most common ways to legitimatize new propositions in a religion is to project it into the past; to claim it has always been there, to attribute it to some authoritative person(s), to refer its transmission into the present to subterranean (oral, esoteric) channels. This may be called the **argument by anachronism.** To repeat, because it is important to realize it, such ways are not peculiar to Judaism, but common to all the major religions. Within Jewish culture, many works were written in Biblical style and under antique pseudonyms during the pre-Talmudic centuries, which the Talmud sages themselves nonetheless rejected for various reasons. Some people claim the book of Daniel to be such a later work, which the Rabbis however kept in the canon. More recently, a classical example is the *Zohar*[278].

Some people, naturally, question the antiquity of the Torah itself (i.e. the Five Books of Moses), suspecting it to be a cumulative work of many authors and editors spread over several later centuries, which was attributed by them to an ancient, perhaps merely legendary, character called Moses. Some people claim to have textual indices to that effect (I have not studied these claims). That, of course, is a very radical approach. But even granting, in its main lines, the traditional presumptions regarding the Torah itself, and later books of the Bible (the Nakh), it is important to realize that the argument by anachronism is repeatedly and very frequently, implicitly if not explicitly, used in the Talmud and thereafter. The trouble with this

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278 According to historians, including Gershom Scholem, this work was written mainly by Moses de Léon (13th cent., Spain), who pseudoepigraphically attributed it mainly to R. Shimon Bar Yochai (2nd cent., Holy Land). Although the work suddenly appeared on the stage of history, many Jews were soon convinced of its authenticity, and many still are today. So much so, that it has even affected Halakhah in two or three instances. For example, according to what I was taught, the exemption from wearing tefillin (phylacteries) during the intermediate weekdays of Pessach and Succoth is based entirely on the authority of the *Zohar*.

argument, is that it is usually as difficult to disprove as to prove. There is usually an iota of conceivability, however much the evidence or lack of evidence militates against the notion concerned.

> The Torah period of Jewish history is virtually inaccessible, it seems, to historians (though, of course, quite a bit is known about surrounding cultures). The period of Jewish settlement (Judges, Kings) to the First Exile and Return (Ezra), is more accessible, thanks to the Nakh itself and archeological discoveries (few of them documentary) in the Holy Land and beyond. The period of the Second Temple, to the beginnings of the Mishnah, is, surprisingly, a relatively dark age of Jewish history with regard to documentary material; perhaps little was written and much was destroyed. Then comes a strong Rabbinic movement, starting with the Mishnah and growing with the Gemara; a vocal movement, full of advocacies and certainties, with its peculiar conventions and methods. But even in this Talmudic phase, it is relatively difficult to firmly establish the historicity, or myth, of certain claims.

How, then, can anachronism be checked and countered? The answer is to refer empirically to more recent Rabbinic discussions. As historical evidence increases, the probability of error in our evaluations of anachronistic claims decreases. It is easy to invent fairy tales (very unlikely stories) when the data in question is well out of reach; but manipulatory constructs become unacceptable, when the data is available, or when it ought to be but is not available. If we analyze how contemporary or relatively modern Rabbis develop Judaism, we can safely extrapolate our findings to their predecessors. Here, the processes involved *in fact* are made evident:

1. A legal problem arises, **not explicitly foreseen** by previous religious authorities (from Torah through Talmud and beyond). If the issue concerned had been explicitly foreseen, or even could easily be deduced from available law, there would be no discussion about it today. Our concern here is, by definition, with such cases: for example, the use of electrical equipment on the Sabbath[279].
2. It cannot be said that the present Rabbis already know the answer, through some sort of oral or written transmission, since they are all **evidently looking for it,** and debating possible answers among themselves. Note well the logical impossibility of anachronistic claims nowadays: in the Talmud, oral transmission could be claimed, knowingly or by supposition, and there was little possibility of verification[280], *but since then, the "oral" law has in fact become more and more exclusively* ***written****, and therefore subject to objective scrutiny.*
3. For each Rabbi addressing the problem, the process of answering is the same: bound by his well-absorbed Jewish cultural standards and inhibitions, and informed by his broad knowledge of official Jewish methodology and law, and some knowledge of ambient living conditions and science, and aided by his personal level of intelligence (penetration and breadth of insight, intellectual rigour) and imaginativeness, **he proposes a possible**

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279 Current electricity was virtually unknown to us until the end of the 18th cent., and the discoveries by L. Galvani in 1796 and A. Volta in 1800.

280 A Rabbi could honestly claim having received some belief from his teacher; but who can say whether what his teacher taught him was in turn received from *his* teacher, or was a personal insight? The intermediate teacher may have simply omitted to specify the fact either way, and his successor presumed it was an old tradition! The degree of veneration in which ancients held their teachers has to be taken into consideration. Multiply this uncertainty by the number of generations from Sinai to Talmud, and it grows exponentially.

solution (or a number of them) for consideration by his peers, and a dialectic is put in motion. This is very normal inductive procedure, practiced in all fields.

4. The proposed solutions to a problem made by the various Rabbis involved, are of course made in the framework of past Jewish law, as much as possible with reference to precedents and analogies found in the literature. Nevertheless, since neither question nor answer were previously known and dealt with, we have to rely on **the possibilities which occur in the minds of the people concerned**. Granting that these people have perfect credentials, with regard to piety and knowledge of Jewish law, there still remains the issue, for each one, of his acquaintance with secular knowledge to date and his honesty about it, and his intelligence and imaginativeness. This is the human element in decision-making, in Jewish law as everywhere else, and there is no escaping it. Even if these people are in fact saints, the rest of us are still required to consider it.
5. Now, the next step is in fact the most interesting. The solution proposed by an authority may be universally accepted, or it may be accepted by some of his colleagues and refused by others. It may end up integrally or in modified form in the Halakhah - or it may even be totally excluded from the Halakhic domain in question. But, being the suggestion of a respected Rabbi, it remains potent in Jewish culture, and several centuries later it may suddenly be revived, in relation to a very different issue, by virtue of some possible analogy. The fact that it was said by an authority (i.e. someone who won *other* legal debates) and *a long time ago*, gives that proposal of his **the status of being a "tradition".**
6. This status, irrespective of the fact that the idea had a human origin, and that its originator was functioning on a more limited scientific database and may even not have won the debate of the time, is passed on to any subsequent ideas, in whatever other contexts, which manage to claim some reliance on the "tradition". Moreover, not only does the old proposal become a **springboard** for new ideas, but it also sets up **boundaries** for subsequent discussion. That is to say, subsequent discussions must take that "tradition" into account, and remain somewhat consistent with it and not exclude it absolutely. It becomes 'raw data', effectively, with all the potential for growth and limitations implied.

This pattern of growth, which we have just depicted, is actual, observable fact. Follow any Rabbinic debate and these elements should be evident to you. "Tradition", paradoxically, keeps growing. Even if much uncertainty surrounds Talmudic traditions, whether or not they all came from Sinai - we can show with certainty that in more recent times, new "traditions" are first formed by the faculty of imagination of some individual and after some time acquire the status of icons. By extrapolation, it is reasonable to suppose that similar processes occurred in less accessible historical time[281].

> I personally find it hard to imagine that all the words on Jewish law spoken or written in the past 3,300 years could have all been uttered first by one man, Moses, and from then on repeated from generation to generation. Surely, no human being would have enough *time* in a lifetime to just *say* all these words, let alone follow their meaning. Even if the first transmission from God to Moses was miraculously fast, and miracles attended the transmission from Moses to other men; we must still

281 The story of Moses sitting at the back of a R. Akiba class, and being surprised by the new laws taught in his, Moses', name, show that the Talmudic Sages were already aware of this paradox (*Menachot* 29b; according to Lewittes, p. 57). By definition, tradition must be static: the notion of a dynamic tradition is a contradiction in terms.

account for the subsequent stages of transmission. Furthermore, the powers of human memory must be empirically considered: how much it can absorb in a certain amount of time, how much it tends to forget over time, and also the possibilities and statistical probabilities of mistaken "remembering". It is very reasonable to assume that Moses transmitted *some* oral teachings besides his written legacy; and conceivable that *some* of these teachings were transmitted through the centuries; but *how much* and *which* of his oral teachings have reached us is moot.

It should be remembered that there are indications in the Bible itself that transmission of the law was occasionally interrupted, the most touted of which is the story in 2 Kings 22:8-13 (and its parallel in 2 Chronicles 34:14-21). It is there told that, during king Josiah's reign, the High Priest Hilkiah "found the book of Torah (*sefer haTorah*)" in the Temple. The definite article *the* in this statement signifies that *a specific* scroll of Torah was found. Some commentators suggest that this was *the original* scroll, written by Moses; and they explain Josiah's alarm as due, not to his (and everyone else's) total ignorance of the law at the time, but to the fact that the scroll found was positioned at an unfavourable passage. Others, however, explain the "the" as reflecting Hilkiah's knowledge that, though all other copies of the Torah had been destroyed in the preceding idolatrous period, *one last* copy (even possibly the said original) had been hidden, and he had hoped to find it.

The first opinion, being less tortuous, sounds more credible to me. But the second is conceivable in the context of data available. Note that further on the king is told that Hilkiah found "*a* book", which may either mean that, unlike Hilkiah, the speaker and the king were unaware of loss of the original scroll; or, alternatively, be indicative of surprise and gladness that a scroll, *any* scroll, was found, whereas they had assumed all scrolls lost. Thus, there is a logical possibility that the Torah was, if not entirely forgotten by most people, largely ignored, for an extended period, maybe some 70 years (during Manasseh's reign, 55; Amon's, 2; and the first 10 of Josiah's). If, as some commentators suggest, the book in question was only Deuteronomy, that still represents almost a third of the 613 commandments (200 of them, of which 77 positive and 123 negative).

If the written Torah was wholly or partly out of circulation for a long time, the oral law must surely have suffered considerably. There was evidently not a complete black-out, since loyalists like Hilkiah and Huldah the prophetess, and various cultural vestiges, remained; but gaps in knowledge of the law may well have resulted.

The *plurality* of conflicting "traditions" tends to confirm the thesis that, even in Talmudic times, new ideas were being variously developed or had only recently been variously developed. But orthodox commentators, in the face of this plurality, have advanced the comforting counter-thesis that God wished to stimulate discussion and leave room for decision-making and so gave the Torah tradition 'seventy facets'. Thus, the fact of plurality in itself proves nothing either way. However, there are other indices that conflicting schools of thought were a cultural development of Talmudic times: in the earlier Tanakh literature, there is little hard evidence of similar legal disputes, and moreover (as shown in the example of a-fortiori argument in the present work) there is no evidence of a sufficiently developed logical language.

13. ON THE CONCEPT OF *MITZVAH*.

Jewish tradition assigns various technical characteristics to the concept of mitzvah. *In this chapter, we will try to clarify some of them, and analyze their formal implications, making comparisons to natural ethical logic.*[282]

1. Basic Properties.

The term ***mitzvah*** (pl. ***mitzvot***) is usually translated as commandment(s). Mitzvot ***asseh*** (do's) are positive commands or imperatives; mitzvot ***lo-taasseh*** (do-not's) are negative commands or prohibitions. Strictly-speaking, this is not quite correct. Some of the 'mitzvot' are indeed imperatives or prohibitions, but some, whether directly or by implication, are rather only permissions (i.e. negations of prohibitions) and/or exemptions (i.e. negations of imperatives).

For examples: Deut. 23:25, "when you come into your neighbour's vineyard, you may eat grapes" (which refers to a labourer at work), is a case of direct permission; or Exod. 13:13, "and if you will not redeem it, you must behead it" (which refers to a firstborn donkey), is a conditional imperative, which by implication implies a permission. In some cases, the imperative and permission do not have the same logical subject; thus, in Lev. 19:10, the crop-owner's obligation to leave gleanings for the poor, implies the right of the poor to go into the field and take them.

But note that, in some cases, a statement which has the form of a permission, is received rather with emphasis on an implicit imperative (for instance, Deut. 14:11, which reads "every clean bird, you may eat" is taken to mean that one must examine a bird and make sure that it is kosher before eating it; similarly with Lev. 11:2, 9, 21). Some passages which might more naturally be understood as merely permissive, are seemingly interpreted more extremely as imperatives (for instances, Deut. 15:3 or 23:21, which read "from a gentile, [go ahead]" - "exact repayment [of loan, even in *Shemitah* year]" or "take interest", are interpreted by some as meaning 'you *must* do so', rather than as merely 'you *may* do so'; similarly, Deut. 17:14-15 is understood to mean that Israel not just may but must (eventually) have a king.

So we have to interpret the term mitzvah/command, here, as including 'command to allow' and 'command to exempt', as well as 'command to obligate' and 'command to forbid'. This sort of nested reiteration might raise formal problems, if taken too literally. Rather, I

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282 Kahan's *Taryag Mitzvos* is worth reading in this context, as an illustration of how mitzvot are currently taught to laypersons. Many of the examples proposed here were drawn from that work, though their analysis is my own.

think, the best thing is to understand the term 'command', for lack of another, as having as well as its narrow sense of imperative, a broader sense which includes prohibitions, permissions and exemptions, as well.

One might argue that reiteration does reflect an aspect of the concept of mitzvah, namely that even contingent ethical propositions, if true, are products of God's will and therefore imply a command. But then, a command to whom? Some might answer, to the religious authorities, telling them to tell the lay people what they must, must not, may, may not do. However, I do not think that Judaism wishes to be so extremely authoritarian; it acknowledges a more direct relation between layperson and God.

Also, I do not think that we are logically forced to regard contingent ethical propositions as expressions of God's will; it is not inconceivable that God is simply open to either course implied by such propositions. In other words, the totalitarian thesis, that "everything is regulated" within a religious ethics, is not logically inevitable; it is quite conceivable (though some people, with fanatical inclinations, would doubt it) that God allows for (perhaps even rejoices at) some human spontaneity, so that humans have some (however much or little) freedom of choice, not only in the sense of natural capacity, but also in the sense of ethical liberty.

In more formal terms, the issue may be expressed as follows: in natural modality, a proposition of the form "X is *capable* of doing Y" is usually associated with a proposition of the form "When X is in such and such a situation, he is *forced* to do Y", which expresses the conditions under which the potentiality is necessarily actualized. One hypothesis (known as determinism) is that such association is not only usual but universal; the opposite hypotheses (positing spontaneity or freewill) are that there exists cases where a potentiality does not imply a conditional necessary actualization.

Similarly, the issue totalitarianism versus partial liberty arises as follows in ethical modality: a proposition of the form "X is *permitted* to do Y" may or may not presuppose a proposition of the form "When X is in such and such a situation, he is *obligated* to do Y" - the issue is not formally resolvable; either position, ethical determinism and ethical indeterminism, is a hypothesis. Note in passing that the English language, by using passive verbs like 'is permitted', already implies that liberty is endowed; but a more impartial terminology would reflect more the inherent independence of liberty, its conceptual primacy.[283]

The following are some of the terms found in Talmudic discussions referring to mitzvot:

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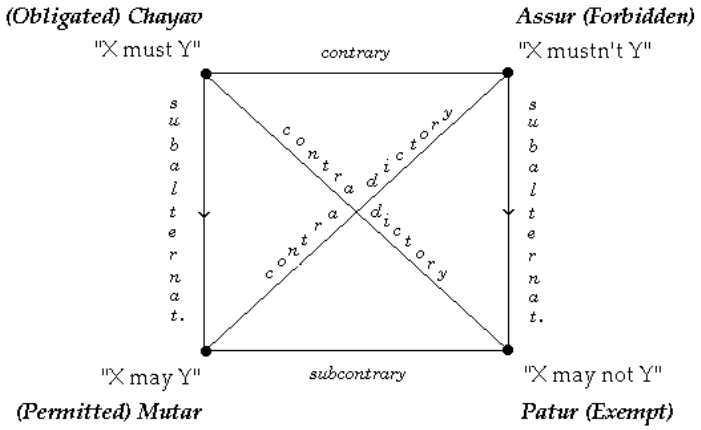
283 The simplest explanation of permissive and/or exemptive ethical propositions in the Torah, is to suppose that God wanted to preempt us (or the Rabbis) from drawing a prohibitive or imperative conclusion.



There are many other equivalent terms, needless to say; in Hebrew, such as *tsarikh*, *zakai*, in English, such as prescribed, prohibited, allowed, and so forth (check out your thesaurus for more). These concepts are normally understood by logicians as ethical modalities - attributes of relations, conceptually similar to (indeed subsets of) necessity, impossibility, possibility and unnecessity, but in the ethical field, implying some prior standard(s) of value, ultimate norms - and having (among others) the following logical characteristics:

(a) They are in principle obvertible, so that if, for subject X, the doing (in the widest sense) of Y is an obligation, then not-Y is forbidden, and if Y is forbidden, then not-Y is an obligation; and likewise, if Y is permitted, then not-Y is an exemption , and if Y is an exemption, then not-Y is permitted.

(b) They form a normal 'square of oppositions', so that obligation implies (but is not implied by) permission, is contrary to prohibition, and contradictory to exemption; and likewise, prohibition implies (but is not implied by) exemption, is contrary to obligation, and contradictory to permission.

However, as already discussed in an earlier chapter, Talmudists would be likely, more often than not, to interpret these concepts somewhat differently. For them, at least *ab initio*, permission and exemption would be understood as *davqa* positions, and therefore as implying each other, and being together contrary to both obligation and prohibition. In that case, one may educe "X may not-Y" (as well as "X may not not-Y") from "X may Y"; and similarly "X may Y" (as well as "X may not Y") from "X may not-Y". In certain cases, the preceding *lav davqa* interpretations might be preferred, if the *davqa* ones turned out to be untenable for some reason.

Going further, a question arises as to whether the Hebrew expressions '*asseh*' and '*lo-taasseh*' ('do' and 'do not do') are intended as general words, signifying any verbs, or whether they signify more specifically *volitional* 'action' and 'restraint from action', respectively.

In the general sense, verbs are fully obvertible: 'does X' implies 'does-not do not-X', and 'does-not do X' implies 'does not-X'; this is the sense preferred by formal logic, because of its simplicity. Whereas, in the more special sense, concerning human will, with its psychological, physiological, environmental, social, political and spiritual concomitants, which is the domain of interest of ethics, various nuances have to be taken into consideration.

An ‘action’ may refer to a thought (a purely mental event); to an emotion (a psychosomatic expression of pleasure, pain or indifference, love, hatred, or non-commitment, in various configurations and degrees); or to a physically-manifest event, with all its implications within the individual(s) concerned and all its consequences in the surrounding natural and social context. In this sense, then, ‘action’ refers to an act of the human will, which may *range from fully voluntary and conscious to very-nearly involuntary and/or unconscious*, but must in any case have some degree of freedom to be subject to ethical legislation, under any system.

Note that, contrary to what one might expect, thoughts are often subject to legislation: for though cognition is ultimately an objective event, the observer can often choose the direction of his/her attention, the course of his/her research, and the price (i.e. conditions) of his/her belief-attitudes. Similarly, emotions are in a sense ‘passions’, but the value-judgments originally underlying them are often a relatively free choice, and a person may often choose to suppress emotions, more or less control them or give them free rein, and actions (of varying value) may then follow. Certainly, we find within Judaism laws relating to belief (to believe in the Lord/God’s existence, oneness, sovereignty, not to believe in other gods) and to love (to love the Lord/God, to love one’s neighbour as oneself, not to hate one’s brother in one’s heart).

Lastly, while it might be that an individual can have influence on his/her natural and social surrounds directly through his/her thoughts and emotions (I mean, by telepathy), in most cases, certainly, such influence can only take shape through the medium of physical acts (be they words or sounds spoken or unspoken, facial expressions and gestures, or pushing, pulling and other movements) of the individual.

Also to note: as far as religion is concerned, ethics concerns not only the impact of individuals on their own body and mind (including soul), and on their physical and social surrounds, but also their (alleged) effect on “upper and lower spiritual worlds” of mystical significance. While some rituals are more or less explicable in immanent terms, many are reputed or presumed to have transcendental purposes. But I will not make further remarks on such relatively metaphysical topics.

My only interest being here to point out the differing senses of ‘doing’, and to briefly demonstrate that once one goes beyond the simple, general sense, the issues become rather complicated. For these reasons, formal logic usually concentrates on the broadest sense of the verb ‘to do’, with which no essential distinction other than polarity exists between positive and negative commands.

Where the more specific sense of human action is intended, we have to keep in mind at least the following categories: ‘doing’ and ‘avoiding doing’ (both of which signify some degree of volition and awareness), and ‘absence of doing’ and ‘absence of avoiding doing’ (which merely negate the preceding two categories, without implying volition and awareness and without excluding them). All this is obvious enough, and was (it seems to me) clearly known to the Talmudists.

The following is a more technical presentation of the concepts under discussion:

For the most abstract forms, where ‘do’ refers to any verb, positive or negative, active or passive, whatsoever, (a) all imperatives with a zero or even number of negations are equivalent, and (b) all those with an odd number of negations are equivalent, and these two

sets of forms are contrary to each other. This refers to the following forms (I use the formulas "that's good," "that's bad," to express the black and white value-judgments involved):

a) **X must do Y** = X mustn't do not-Y = X must not-do not-Y = X mustn't not-do Y = if X does Y, that's good; if X does not do Y, that's bad.
b) **X mustn't do Y** = X must do not-Y = X mustn't not-do not-Y = X must not-do Y = if X does not do Y, that's good; if X does Y, that's bad.

However, in contrast, if we interpret 'doing' as meaning specifically 'willing', obversions are not always feasible, and we obtain four variously opposed sets of two forms (c through f, below), instead of two contrary sets of four forms (a, b, above).

c) **X must will Y** = X mustn't not-will Y = if X wills Y, that's good; if X does not will Y, that's bad.
d) **X mustn't will Y** = X must not-will Y = if X does not will Y, that's good; if X wills Y, that's bad.
e) **X must will not-Y** = X mustn't not-will not-Y = if X wills not-Y, that's good; if X does not will not-Y, that's bad.
f) **X mustn't will not-Y** = X must not-will not-Y = if X does not will not-Y, that's good; if X wills not-Y, that's bad.

About the oppositions between these forms. Note that, given "X wills Y" and "X wills not-Y" are incompatible, whereas "X does not will Y" and "X does not will not-Y" are compatible, it follows that "X wills Y" implies (but is not implied by) "X does not will not-Y", and that "X wills not-Y" implies (but is not implied by) "X does not will Y".

Now, the forms (c) and (d) are contrary, since they disagree regarding whether "X wills Y" is good (c) or bad (d), and likewise whether "X does not will Y" is good (d) or bad (c). Similarly, for the forms (e) and (f). However, since "X wills Y" (good) found in (c) implies "X does not will not-Y" (good) found in (f), and "X does not will Y" (bad) found in (c) is implied by "X wills not-Y" (bad) found in (f), the forms (c) and (f) are compatible, but neither implies the other. Similarly, for the forms (e) and (d).

2. Complementary Factors.

When God tells us to do or not-do something, is He just concerned with that one thing He has mentioned, or with a much larger, unstated context?

Perhaps just doing what one is told by God to do, is all that counts. Or perhaps this bottom line is duly rewarded; but also, as one enriches the deed with better ***kavanah*** (pl. ***kavanot***), as defined below, the reward increases proportionately. Similarly, on the negative side: there may be gradations in seriousness, ranging from a minimum for "sin through error" (implying that one has a certain responsibility for ignorance or neglect), to a maximum for

intentional or willful sin (implying a certain rebellion). Or perhaps, more extremely, the performance of a positive mitzvah or non-performance of a negative mitzvah require an adequate kavanah (or, rather, a certain collection of kavanot), and does not otherwise count at all.

Kavanah includes various factors:

(a) A certain degree of **awareness** of one's activity or inactivity; so that it is a product of will, and not merely an automatic reaction (a reflex or habit or chance occurrence). For example, while praying, being aware of the meaning (at least the plain meaning, if not the deeper meanings) of the words one utters, would fall under this heading.

(b) The proper **motives**: this concerns the causal background influencing the deed. Included here are (i) more or less conscious goals, like gaining a place in the world-to-come, or earning earthly rewards, such as a wife and children, long life, health, knowledge, success, riches, and so forth; and (ii) undeclared/unadmitted, subconscious or unconscious goals, which constitute the relatively hidden psychological context, such as power-lust for instance. Apparent motives are not necessarily true motives; here, complex needs for introspection are implied.[284]

(c) The **intention** to thereby *fulfill the mitzvah*, as such, i.e. as a command from God given through Moshe at Sinai. One may view this, though the ideal motive, as just a necessary motive, a *sine qua non*, without having to be the only motive, *exclusive* of any other. Or, more extremely, one may insist on obedience without selfish motive whatever, purely *lishma*, "for its own sake," or *leshem Shamaim*, "for the sake of Heaven."

(d) We might additionally mention, though it does not strictly qualify as kavanah, the *emotional context*. Treatises on the performance of mitzvot always stress the significance of mood or **attitude**: goodwill, doing the job at hand with joy (*beratson*), adds to the value and virtue of one's good deed, and conversely resentment and such depreciate it. This is quite understandable, at least from the point of view of the order-giver, who does not want the annoyance and interference of negative vibes (stiff-neck); from the viewpoint of the order-receiver, however, there may be a felt need to express dissatisfaction or disagreement, of involuntary compliance.

According to some Rabbis (including, as I recall, the Rambam and the Chafets Chaim), without the required kavanah the action done or not-done is considered mere happenstance, and does not constitute fulfillment of the corresponding mitzvah.

Now, the above is a very heavy doctrine, whose logical implications are manifold. For what it means, in formal terms, is that the Divine commandments given in the Torah, although

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284 Note that in some cases, as I recall (though I cannot appose an example offhand), Scripture itself mentions a motive; if so, it would seem obvious that the specified motive must play a role. As a rule, the Rabbis disapprove of explanations for mitzvot, for fear that the mitzvot might be erroneously limited thereby. For instances: to say that shaving is forbidden *because* heathen priests engaged in it, might lead people to regard shaving as permissible so long as not performed with idolatrous motives; or again, to say that pork was forbidden *because* it went bad quickly in hot countries, might lead people to regard it as permissible in cold countries or in the days of refrigerators. But a corollary of that view would be that if Scripture ever explicitly mentions a motive for a mitzvah, then the performance of it *without* that motive would seem, logically, to be equivalent to non-performance (i.e. to constitute, for a positive mitzvah, a useless act; and for a negative mitzvah, a legitimate loop-hole). A *davqa* reading, akin to a *klal uphrat* inference, would in such case seem justified; but I do not know if this position is accepted traditionally, or whether the Rabbis nevertheless generalize the mitzvah.

expressed in simple forms like “do this” or “don’t do that”, are really meant as more complex forms, which include a multiplicity of tacit qualifications. Clearly, this changes their logical properties. For instance, the two ethical propositions below have very different logical properties:

- “X must do Y” (simple).
- “X must do Y *and* be aware (to degree *k*) of doing Y *and* have motives *l, n, m* while doing Y *and* do Y in order to fulfill the command to do Y” (complex).

When I say that two such propositions have different logical properties, I mean that they have different contradictories, different implications, and so forth - just as any elementary proposition ‘P’ has different logical properties, compared to any compound proposition ‘P+Q+R’. All the more so, since the additional elements include mention of the same subject and/or predicate in a complicated variety of ways.

It follows that, if the doctrine described above is to be accepted literally and in full, so that there are effectively no simple ethical propositions in Judaism, then the logical system applicable to it is not (as often presumed) the system which applies to simple ethical propositions, but a much more elaborate system appropriate to the more complex forms, with strings of qualifications of the simple relations. It is very important to realize the full weight of this implication of the doctrine.

There are yet other complementary factors which might need to be taken into consideration:

In a natural ethics, the **reward/punishment** factor is built-in, because the things one should or shouldn’t do have a natural causal relation, constructive or destructive, to one’s standard of value - normally, human welfare. The doing or not-doing of so and so *causes* an improvement or a damage in the goal(s) which constitute our norm; and the seriousness of the measure depends on whether this causation is necessary or merely helpful, sufficient or partial, categorical or conditional, etc.

Here, “X should do Y”, *because* if X *does-not* do Y, the ultimate goal(s) Z will be *dis*favoured; or “X should not-do Y”, *because* if X *does* do Y, the ultimate goal(s) Z will be *dis*favoured; or again, “X may or may not do Y”, because whether X does or does-not do Y, the ultimate goal(s) Z will *not* be disfavoured, though one way may be more favourable than the other, or unfavourable consequences may arise, one way and/or the other, only under certain conditions instead of unconditionally.

But in a religious ethics, that is: one based on Divine Revelation, such causal relations are not always apparent, especially in that the ultimate goal(s) involved may not be altogether explicitly known to us (though commentators may variously presume this or that to be God’s intentions). Moreover, the personal or collective reward/punishment may not in all cases be in a naturally-apparent manner causally-connected to the deeds, but may rather be connected by Divine fiat, as it were, in hidden pathways. I mean, granted that Nature is also a product of Divine fiat, religion still presumes that some relations are intrinsic to it (immanent, natural), while others use more extrinsic pathways (transcendent, miraculous).

Thus, in religion, the reward or punishment, which we will symbolize by Z1 and Z2, respectively, has the following formal relation to the command: "X should do Y, *and* if X does Y then Z1 is promised, *and* if X does not do Y then Z2 is threatened"; and similarly, in the case of "X should not do Y", *mutatis mutandis*. The imperatives are associated with promises and threats, but one may not formally *infer* from these imperatives negative natural-conditional propositions.

Here, the reward/punishment complex is a Divinely-instituted *appendage*, which may not (though it also may) have any natural causal connection to the (positive or negative) imperative. The result is not automatically consequent, under Natural Law, but mediated by *ad hoc* acts of will by God on a case-by-case basis. Even if God's choices are consistently uniform, they always retain a more voluntary character. This hypothesis would explain the irregularity of results (which might alternatively be due to the complexities of the natural causalities involved, of course), and fits neatly with the doctrine that God wishes to reserve for Himself the option of mercy and forgiveness.

In this context, the issue of *redemption* arises. In nature, some mistakes can be corrected, and others cannot. In Judaism, by special Divine dispensation, as it were, we are more often than not offered further possibilities of redemption, the undoing and forgiveness of *fait accompli*, beyond the natural, through repentance and personal change (*teshuvah*), through charity (*tsedakah*) and sacrifice in the Temple (*korbanot*). All this has logical significance.

Another issue with possible relevance is whether reward/punishment are related to **effort**. Is God's only interest in *tachlit*, the bottom line, getting the job done, or is the effort expended in fulfilling a mitzvah significant to Him? Effort means work against resistance, the resistance of one's own faculties or weaknesses or diverse external factors; or, in other words, in a terminology dear to the Rabbis, the counter-pressure of the *yetzer haraa*, the "evil inclination" allegedly possessed by mankind in particular and this-world in general.

With regard to reward, if two people fulfill the same mitzvah, and for one it was an *easy* thing and for another a *difficult* thing, are they at the same moral/spiritual level? The one for whom it was easy is in a sense proved the higher, in view of the facility experienced; but the one for whom it was more difficult is in another sense proved the higher, in view of the extra effort dedicated.

More specifically, for instance, if a person never kills or never steals or never commits adultery (and many people fall in those categories), is such a person always credited with virtue? Or does the merit depend on having been tempted and resisted temptation, as some Rabbis claim, and does the merit grow as a function of the difficulty encountered? In other words, to use a technological image, is only heat-production respected in Jewish law, and superconductivity looked down upon?

More formally, does "X must do Y" imply, in the Torah, "if it takes X an effort to do Y, he is rewarded; else, not"; and does "X mustn't do Y" imply, in the Torah, "If X is tempted yet resists to do Y, he is rewarded; else, not"? It may not be possible to answer such questions on formal grounds; any doctrine which is internally consistent, which presents no inherent difficulty, is on equal footing from that point of view.

With regard to the negative mitzvot just mentioned, I would like to comment that people are in fact constantly tempted: any cause for anger, real or imagined, is effectively a temptation for violence and (eventually) murder, every object one can pick up (which belongs

to someone else) is a temptation for theft, every woman that passes by is a temptation for rape and (if she is married) adultery. So, even if such temptations were regarded as so small as to be nearly zero, for most people, or the overcoming of them was viewed as generating a virtually negligible credit, for most people, we could still not truly claim in such cases that *no* temptation at all was involved and therefore that no resistance to temptation took place.

The idea of the more extreme Rabbis may be expressed more fully by saying that each mitzvah refers to four outcomes (leaving aside more complex issues of kavanah mentioned earlier) as follows: for example, that "X must do Y" in the Torah is intended to mean "X must will Y" (see form (c), in the previous section), so that:

- if **X wills Y** (= active performance), the mitzvah is fulfilled and rewarded;
- if **X does Y, but does not *will* Y** (= passive performance), the mitzvah is not truly fulfilled and no reward follows;
- if **X does not will Y, yet as it happens does *not do* Y** (= sin of omission), the mitzvah is breached though perhaps relatively less punishably;
- if **X wills not-Y** (= sin of commission), the mitzvah is breached in a more punishable manner.

Similarly, that "X mustn't do Y" in the Torah is intended to mean "X mustn't will Y" (see form (d)), and this entails four outcomes as above, mutatis mutandis; and likewise, supposedly, for "X must do/will not-Y" (see form (e)) and "X mustn't do/will not-Y" (see form (f)). All that in itself seems consistent.

With regard to punishment, is a person who has tried his/her utmost to perform a positive mitzvah or resist a temptation to sin, but failed, treated less severely than one who has tried less or not tried at all? This question can also, like the preceding one, be expressed in formal terms; it proposes further gradations. Our human sensibilities concerning Justice would answer yes to it; Judaism tends to agree in principle, though some stories seem to suggest that sometimes this is irrelevant.

Still further distinctions and gradations are called forth when we consider the issues of kavanah. For instance, a person who did not know the law, having say been kidnapped far from the community, and who consciously eats pork, is not comparable to someone who knew the law and wished to break it to express rejection of it. Such fine subdivisions are beyond the scope of the present study; I only mention them to remind the reader that we have far from exhausted the issues.

While on the topic of reward/punishment, we should mention an interesting concept of deontology (general ethical logic) found in the Bible and Talmud, that of **remedy**. For example, it is forbidden to steal (a negative mitzvah), but if one did steal, returning the stolen object to its owner (a positive mitzvah), in some cases with an extra amount of the same object, frees the thief from the penalty incurred (such as lashes). Similar examples can be found in man-made law and 'natural' ethics.

Such corrective processes can be expressed in formal terms, as follows. In some situations, X causes Y *and* NotX causes NotY; whereas in other cases, though X causes Y, NotX does *not* cause NotY - so that the *damage done* (Y) by the violation (X) cannot be

undone (NotY) by a remedy (NotX). This is an insight, primarily, of causal logic, namely that some causal relations are reversible, whereas with others "what's done is done" - they are 'entropic', we might say.

In a broader sense, all reward or punishment, whether in this world or in the afterlife, is considered as remedy. This is the concept of ***tiqun*** (repair), so dear to and widely used by Jewish mystics. Life is either degeneration (through sin) or putting things right (through good deeds or through reward/punishment by society or by God). Note that reward is ultimately as much a *tiqun* as punishment, in that a never-rewarded good deed is comparable to work without wages, there is an injustice involved, something which should have been completed has not been.

> It should be stressed that the Rabbis nowhere (so far as I know) explain just how they know that mitzvot were intended by God to have the various special features they ascribe to them. Certainly, the Written Torah is not as explicit as they are on such matters. Nor are any of the inferences - emerging from by the special features discussed in this chapter - included in the main lists of hermeneutic principles; nor is it anywhere shown precisely how such forms of argument might be read into the Torah text by means of the listed hermeneutic principles. The special features of Rabbinic ethical logic are merely taken for granted, as part and parcel of the oral tradition; and perhaps viewed as implicit to some extent in the behavior of exemplary characters found in stories in the Torah, Talmud and later inspirational literature. There are, as we have pointed out, discussions among Rabbis as to their ultimate force of law. I would suggest that such special features developed gradually in Rabbinic lore, generated by the idealism, and sometimes the oneupmanship, of successive Rabbis.

Note, finally, that mitzvot may have still **other features** (unrelated to the above). For instance, mitzvot are quite often temporally related, in forms like "**you [the person(s) concerned] must perform Mitzvah A before Mitzvah B**". These constitute complementary commands, say C, whose subject is the same as A and B, and whose predicate contains two commands in a specified sequence. Such statements may have any polarity or modality[285]; and may be - as well as categorical - conditional, in diverse and eventually complex hierarchies. Needless to say, the formal logic of such propositions can get rather complicated. This feature is not peculiar to Jewish deontology, but may be found in natural ethics, where complementary means to an end are often similarly ordered.

> An example from Judaism is the sequence recommended for the mitzvot of *tallit* (prayer shawl) and *tefillin* (phylacteries; leather boxes containing extracts from Scripture, with straps); within the latter, in turn, the *rosh* (head) *tefillin* is to be put on before the *yad* (arm) *tefillin*. Strictly-speaking, these are independent mitzvot, but the order in which they are here listed is the ideal. We are also told precisely at what stages the appropriate blessings should be recited.[286] How all this is proved (if at all) from Scripture is another matter, to do with hermeneutics; our concern here is with formalities.

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285 Other forms include "A may precede B", "A must not-precede B", "A may not-precede B", and so forth. Intermediate modalities like "should preferably" or "should preferably not" can also be used (these correspond to degrees of probability in natural modality).

286 There are many additional prescriptions, such as that if one has taken up the *yad tefillin* before the *rosh tefillin*, one should out of respect continue to put it on, or again, if one speaks in the middle of the process, another blessing must be recited; and so on. From the formal point of view, such details constitute a host of conditional (if-then) mitzvot.

3. How to Count Mitzvot.

One of the interesting, peculiar properties of Biblical or Talmudic/Rabbinic commands is **the non-equivalence between an ethical proposition and its obverse**. That is, "X must Y" and "X mustn't not-Y" (or similarly, "X mustn't Y" and "X must not-Y"), although they logically imply each other, formally, in all cases, may nevertheless in some cases be counted as two Mitzvot! For example, Deut. 22:19, which refers to cases of libel of wife by husband, says both "she shall remain his wife" and "he may not send her away all his days"; having to remain married and being forbidden to divorce are identical, yet are here both specified. Another example is Deut. 25:17 and 19, the commandments to remember and not-forget Amalek's misdeeds towards Israel.

It would at first sight seem like a redundancy, to repeat the same commandment in positive and negative form; or one may suspect that the two wordings were counted as two laws to satisfy some preconceived notion of the 'number of Mitzvot'. But the explanation given by the Rabbis is quite plausible, namely that this emphasis serves not only to doubly encourage obedience of the command, but also to signify the extra possibilities of reward or punishment inherent in its performance or in failure to do so. (Note that the positive and negative mitzvot in question need not be close to each other in the Biblical text: for instance Lev. 19:13 and Deut. 24:15, concerning paying a worker his wages without delay and on time, are far apart yet complementary.)

Thus it is that there is a general (or nearly general) rule, to the effect that: the disobedience of a positive command cannot be punished by Rabbinical courts, though it may have negative social or Divinely-produced consequences, the latter in this life or in the afterlife; whereas, disobedience of a negative command can indeed be punished by Rabbinical courts, though again it may have consequences of one kind or another. With regard to obedience of positive or negative commands, the reward of such obedience is not usually within the competence of Rabbinical courts (though they may in some cases decree a person be honoured, for instance), but may be programmed in nature (by God, of course) or occur as a social phenomenon (most probably due to the ambient culture produced by the Torah) or be effected Providentially (i.e. by Divine intervention) in this world or the next.

Effectively, we have here a specialized *linguistic convention* that: when a command is worded *only* positively, the courts are not competent to punish transgression, whereas when it is expressed *also or only* negatively, they are so. It is a signal, a code, not found in general language, and therefore not a rule of formal ethical logic, but peculiar (we are taught) to the domain of Torah.

Note that, in some cases, the pair of positive and negative commands are not, strictly-speaking, in a purely formal sense, obverts of each other. This may occur when the positive command refers to a finite act of will, and the negative command refers not merely to the absence of that will, but to another finite act of will in the opposite direction. For examples. Deut. 22:29, concerning cases of rape, obligates marriage and forbids divorce; these two mitzvot are not like the above mentioned case of Deut. 22:19 identical, for one might well be forced to marry someone, yet not absolutely forbidden to turn around and divorce her soon after.

Similarly, in Deut. 21:23 the prohibition to allow a man to *remain hanging* overnight and the obligation to *bury* him on the same day as he was executed, are not exact obverts of each other. In Deut. 22:1,3, the mitzvah to return lost property one finds, and the warning not to pass-by and ignore it (so as to avoid the hassle of returning it), are not implied by each other; similarly, with Deut. 22:4, concerning helping one's fellow's fallen animal. Again, the commandments in Deut. 22:6-7 concerning the mother-bird are not inferable from each other (as it might have been required that we take neither mother nor young, or mother but not young).

We also find in the Torah another form of apparent redundancy, **the repetition of certain laws in both generic and specific form**. For example, if incest is forbidden between a man and *various specified* near of kin (Lev. 18:7-18), one might ask what is the point of forbidding it additionally with *any* near of kin (Lev. 18:6). Here again, the explanation given by commentators is that such repetition signals the severity of the mitzvah, and forewarns of the double jeopardy its disobedience implies, in the case of negative mitzvot; or, in the case of positive mitzvot, their importance and double recompense. A calculus is suggested. With regard to the example taken here, one might say that whereas incest in general generates a moral debit of *x*, such practice with a specified near of kin generates a greater debit, $x + y$.[287]

This issue incidentally raises another, of even broader interest to the formal logic of ethical propositions. What are the logical relations between imperatives, permissions, prohibitions and exemptions? This question has to do with modal logic, and as we shall see it may be answered entirely **with reference to alethic (non-ethical) logic**.

We know that, in the logic of non-ethical propositions, while predication of any species syllogistically implies predication of all of its genera, predication of a genus does not suffice to imply predication of *any one* (randomly selected) of its species, though it does imply that *at least one* (without prejudice as to *which* one(s)) of its species must be predicable. By contraposition it follows that: while denial of a generic predicate implies denial of *all* relatively specific predicates, denial of *any one* (or even more than one, provided less than all) of its species is not formally sufficient to deny a given genus, but it takes denial of *all* of its species to ensure denial of a given genus.

As we shall now show, certain rules may be inferred from the above, with respect to ethical logic. The formal relation of ethical to neutral propositions is to be found in **teleology** (a derivative of causal logic). Normative statements refer to *means and ends*, they tell us whether such and such is *needed for, harmful to, or neither needed for nor harmful to,* some accepted *standard of value*. This norm may have its source in revelation, or in rational deliberations or in irrational choices, it may be more or less explicit, and it may be unitary or manifold (provided that it is internally consistent, or at least that its parts are clearly hierarchized).

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287 The example here taken is perhaps not the best, being too complex. The text may naturally be interpreted as *klal uphrat*, meaning that the initial generality is limited to the specifics listed next [fourth hermeneutic rule of R. Ishmael]; or the generality may be viewed as referring to non-copulative erotic acts, while the specifics may refer to copulation, though the wording is the same [*lo tikrav legalut ervah*, don't approach to uncover nakedness]. Also, the subject of these prohibitions is generally masculine [*ish*, a man], without clarification concerning the status of the feminine partners. And so forth - but let us ignore such complications in this context.

In Judaism, the norm is God's Will, whose precise content we know only partly and speculatively, insofar as it is implicitly expressed in the Torah through the laws and stories (and similarly, *mutatis mutandis*, in certain other religions). In Natural Ethics, the norm is general human welfare, which may be broadened to include the ecological concerns, and this is largely explicit and consistent, to the extent that it is knowable through biology and kindred sciences. More subjective ethical systems refer to personal emotions or the welfare of special groups (e.g. a race) as their standard, and are largely unverbalized and often inconsistent. In any case, whatever the standard of value (which we shall label **C**), the following formal relations are set by logical science, for any given action (call it **B**) performed by someone (**A**):

- **A must do B** (B is imperative for A), means that if A does not do B, C cannot occur.
- **A musn't do B** (B is forbidden to A), means that if A does do B, C cannot occur.
- **A neither must nor mustn't do B** (call this 'license', for lack of a better word), means that whether A does or doesn't do B, C can still occur.

Additionally:

- **A may do B** (B is permitted to A), means that B is either imperative or licensed to A.
- **A may not-do B** (B is exempt to A), means that B is either forbidden or licensed to A.

These, then, are the alethic interpretations of *categorical* ethical necessity, impossibility, contingency, possibility and unnecessity, respectively. Our palette of ethical modalities may be extended further with reference to *conditional* teleologies. Thus, for instances, A doing B is *conducive* to C, if it causes C in certain circumstances; and A doing B is *dangerous* to C, if it inhibits C (causes not-C) in certain circumstances. Now, our goal here is to find **the relationships between species and genera of action**. Knowing that a given genus (say **G**) is imperative or forbidden or whatever, what can we infer concerning its species (say **S1**, **S2**, **S3**,...); and vice versa?

a. **If a genus G is imperative**, *no given one* of its species is logically implied to be imperative, or anything else, though it is implied that *at least one* of its species has to be performed, *otherwise G cannot occur, and therefore C cannot occur*. Note well that S1, S2, S3... are disjunctively, but not individually or distributively, and still less collectively, implied imperative by G's imperativeness; it is only the disjunction of the series of S which is affected, each and every S may just as well, in itself, be licensed, or imperative or even forbidden. It follows, by contraposition, that it does not suffice to know that each and every one of its species, S1, S2, S3, ..., are exempt, to infer that a genus G is exempt, but we must establish that the species are not disjunctively imperative, as just defined; note this well! Thus, **if any species, say S1, is exempt,** no inference concerning its genera, such as G, is logically possible.

b. **If a genus G is forbidden**, *all (each and every)* of its species are logically implied to be forbidden, *because if any (one or more) of the species occurred, G would occur, and thereby C couldn't occur*. Here, the prohibition of G is transmitted to S1, S2, S3, ...,

distributively and collectively; the link is much stronger than in the previous case, note well. It follows, by *ad absurdum*, that **if any species, say S1, is permitted**, then all its genera, such as G, are permitted (either imperative or licensed).

c. **If any species, say S1, is imperative**, then all of its genera, such as G, are imperative, *because the absence of G (which is implied by S1) would imply the absence of S1, under which condition C cannot occur*. Note that G's other species, S2, S3, ..., need not for all that be imperative; G's imperativeness, here, is rather incidental to S1's, more in the way of an inevitability, due to the fact that you cannot generate S1 without G; only if all of its species were equally imperative, would G be imperative *per se*. It follows, by *ad absurdum*, that **if a genus G is exempt**, then all its species, S1, S2, S3, ..., are exempt (either forbidden or licensed).

d. **If any species, say S1, is forbidden**, no inference is possible concerning its genus G, *because given that S1 implies not-C and S1 implies G, we can only conclude that G does not imply C (since if G implied C, then S1 would imply both not-C and C, whence S1 would be impossible, contrary to the premise that it is forbidden, which implies potential).* G may equally be imperative (not-G implies not-C, in which case the remaining species S2, S3, ..., are at least disjunctively imperative), or forbidden (G implies not-C, in which case S1's prohibition is simply a consequence of G's), or neither imperative nor forbidden ('G does not imply C' only excludes the possibility that G be imperative to *not*-C, which does not concern us, since it is C that is our standard of value). It follows from all the above, that **if a genus G is permitted**, no inference is logically possible concerning its species S1, S2, S3, ...; each of them could equally be imperative (in which case, G would be imperative, and therefore permitted) or licensed (implying only that G is permitted) or forbidden (nothing implied for G).

Note well, finally, that knowing **a genus G** to be **licensed** (i.e. neither imperative nor forbidden), we can only infer for its species that they are exempt (i.e. either forbidden or licensed); and knowing **any species, say S1,** to be **licensed**, we can only infer for its genera, such as G, that they are permitted. These relations follow from the above. We need not pursue the matter further, here, with reference to conditional situations.

It should however be noted that the above principles, describing *how ethical modality is transmitted or relayed up or down conceptual hierarchies*, can also be expressed in the form of modal syllogisms. The most obvious valid moods being (see b, c, above, which yield categorical conclusions):

G is a genus of S1,	**S1 is a species of G,**
and A mustn't do G;	**and A may do S1;**
therefore, A mustn't do S1.	**therefore, A may do G.**
G is a genus of S1,	**S1 is a species of G,**
and A may not-do G;	**and A must do S1;**
therefore, A may not-do S1.	**therefore, A must do G.**

In everyday discourse by religious Jews, we find the term mitzvah used in a loose, broad sense covering any good deed or proper restraint, which will get you brownie points.

However, in the context of the doctrine that there are **613 Mitzvot** for the Jews, or of the doctrine of **7 Mitzvot** for the Bnei Noach (non-Jews), the term acquires more restricted senses, which are also not quite the same in each system. This phenomenon will now be explained, because it is rather interesting from the logicians' point of view and rather special to Jewish (or Jewish-style) law.

Formal logic deals in meaningful grammatical sentences, each of which symbolizes some phenomenal appearance, be it concrete or abstract, material or mental, empirical or hypothetical, real or illusory. Viewed in this broad-minded way, even the subjective is objective, and logic is at all times open to all candidates to membership in the body of knowledge it seeks to gradually construct. Every event has a great many facets and a great many levels, which are interconnected in a great many ways. Each of these innumerable phenomena, each phenomenon within or next to every other, may be represented for conceptual purposes through verbal propositions; but many objects of perceptual experience or of insight are never verbalized.

In this flexible perspective, it would be absurd and arbitrary to try and dogmatically *enumerate* 'laws' of any kind, and say "there are N laws of nature in such and such a field" (e.g. Three Laws of Thermodynamics) or "there are M moral laws to follow in such and such a situation" (e.g. Seven Cardinal Sins). The enumeration would have to capture all the propositions, *at a certain same level*, which are true and from which all others relating to the topic concerned can be inferred; and it would claim a certain finality.

Such an ultra-rationalistic logistic programme, which is still found among modern logicians with Cartesian inclinations, takes no account of the moment-by-moment import of empirical data which occurs in practice. Such gradual input is bound to affect, not only the applications of laws, but their very bases and contents.

One may, in any science or body of knowledge, identify certain larger principles, however arrived at, as dominating the remaining data, in a way resembling the deductive relationship between axioms and theorems; but every wise thinker keeps in mind the inductive sources of the whole, and remains pragmatic in his approach. All this to say: rigidly *counting* 'laws' would be a very artificial procedure, particularly if one insisted on ***adhering to a given number***. Yet this is found in Jewish law, and predictably affects not only its content, but its form.

Thus it is that different Rabbis will agree *that* there are 613 Mitzvot for Jews, or 7 Mitzvot for non-Jews, in accordance with Talmudic traditions, but will disagree somewhat regarding *which* commandments precisely are to be included in or excluded from the list concerned! So long as they arrive at the correct total, even superficially, they retain a certain legitimacy; whereas a system which refused to recognize the magic number, insisting on an irreducibly larger or smaller number, would from the outset be eliminated. An additional given is that there be **248 positive Mitzvot and 365 negative Mitzvot**[288]. My purpose here is not to criticize such an approach, but to emphasize the logical specificities it generates.

> Still, it is interesting to note that the number 613 [*TaRYaG*, in Hebrew] is only based, so far as I know, on one passing mention in *Maccot* 23b, quoting Rabbi Simlai, and the Talmud has no one-by-one

[288] Said to correspond to the 248 bones of our bodies and 365 days of the year, and implying the necessity to involve all one's faculties all the time to service of God. (I do not know if our bodies really have precisely 248 bones; as for 365 days, that is a round number, corrected in leap years.)

enumeration of these Mitzvot. One explanation of the number that I have read somewhere is that it consists of the sum of: 2 for the first two of the Ten Commandments, which the Children of Israel heard at Sinai directly from God; plus 611, which is the gematria of the word TORaH (T=400, O=6, R=200, H=5), which were received by them indirectly through Moshe. Whether this explanation was constructed *ex post facto*, or was the original reason for the number, I do not know.

One cannot, in such a context, count *just any* mitzvah (ethical sentence) as a Mitzvah (note my use of a capital M). Only certain mitzvot qualify for the honour, and their ability to do so is mainly traditional (for instance, they are in the list proposed by the Rambam in the *Sefer HaMitzvot*, or that in the *Sefer HaChinukh*). One cannot strictly say that these laws, known as *av* (father) mitzvot, are all at the same conceptual level; nor that they taken together will allow the strictly deductive inference of all other laws, though many are indeed inferable (in which case they are called *toledot* [descendants]). Thus, the enumeration has no natural basis; it is an imposed structure.

To some extent, then, the Mitzvot are a grab-bag; which perhaps reflects the complexities of the world to which they are intended to apply. Whereas from the point of view of formal logic (and indeed for codes of law like the *Shulchan Arukh*, as mentioned below), any individual injunction, be it categorical or conditional, imperative or otherwise, would count as an ethical sentence (mitzvah), a traditional Mitzvah (*av* mitzvah) may consist of a cluster of such sentences, in conjunction or in disjunction, explicit or implicit. Perhaps most mitzvot are implied in the Mitzvot; but in all honesty, strictly-speaking, one cannot claim that all are: many details are contributed by tradition or later Rabbinic decisions, and many vary from community to community.

To give an example at random. In Exod. 20:12, "honour your father and your mother", two distinct items are listed (rather than just "parents"), and yet they count as one law. Sometimes, the composition is more complicated: for instance, Deut. 25:3, "Forty strikes may he give him, not more", prescribes the giving of strikes, permits up to 40 of them, and forbids more than forty, all in one and the same sentence. It is not always easy to predict and understand how and why the Rabbis split some sentences into two or more separate Mitzvot, while they kept others, or fused some, as single Mitzvot.

More broadly, let us remark that in some cases, sentences which intuitively might have been considered as laws, end-up rejected by Rabbinic decision; whereas, sentences which might at first sight have seemed incidental story-telling end-up as laws. All this has to be explained on a case-by-case basis, with reference to the relevant Talmudic and post-Talmudic discussions; there is no sweeping justification. The oral tradition also stretches and delimits laws, stating how far they are applicable and detailing their exceptions.

If now we turn our attention from such numerical systems to the developed law-system of the *Shulchan Arukh*, we see that the latter is concerned with listing all the mitzvot (small m), without attempting to count them, which are generally accepted as Halakhah, and even many subcultural traditions (*minhagim*). While the Code of 613 Mitzvot is by definition exclusive, the *Shulchan Arukh* is rather an attempt at exhaustiveness (and a degree of order, for currently relevant laws at least). It is clear that one cannot expect to mechanically derive the thousands of nuances in casuistry of the *Shulchan Arukh* from the 613 Mitzvot. Rather, the 613 could be regarded as heads of chapters, which signify certain collections of mitzvot of varying importance and consensus.

Furthermore, as Aaron Lichtenstein has ably shown in his *The Seven Laws of Noah*, the term Mitzvah does not have quite the same denotation or connotations in the legal code of 613 Mitzvot and in that of 7 Mitzvot. There are parallels and genetic relations between these systems, but there are also some radical differences and differences of detail. Here again, then, the term 'mitzvah' has a varying meaning (even after the elucidation of about 66 equivalences between the two systems proposed by Lichtenstein, as he himself argues).

The concept of 'chapter-heads', rather than 'top principles from which all others are inferred', is also made evident in this work: in the list of Noachic laws, the titles tend to describe an *extreme negative behavior pattern* (for instance, eating a limb off a live animal), without apparently limiting itself to it, i.e. without precluding other proscribed behaviors and even prescribed positive behavior patterns (in the case at hand, against other forms of cruelty to animals and for kindness to them).

We see from the foregoing discussion that the counting of mitzvot is no simple matter.

4. Commanded *vs.* Personal Morality.

According to Judaism, a person has greater merit for doing a good deed if he was commanded by God to do it, than if he merely voluntarily took it upon himself to do it. Indeed, in some instances (for instance, shaking the *lulav* when it is not the festival of Succoth), doing the deed without having been commanded to is useless and gains one no credit; in some instances (as in the case of presumptive keeping of the Sabbath by a non-Jew), it is even counterproductive and punishable.

Ethics, in this perspective, is not 'universal' in the sense of uniform for all - but may vary from group to group or even among individuals. Thus, Jews may have one set of rules, non-Jews another; Israelites, Levites and Kohens may be subject to different rules, as may relatively volunteer classes of individuals, like 'nazirites', judges (within a Beit-Din, or religious court) or kings; men, women, and children need not have the same obligations, restrictions and liberties; prophets or kings may receive very personal orders; and so forth. Not only may rules vary from population to population, but reward and punishment may likewise vary, accordingly.

I see no logical difficulty in this viewpoint, in the sense that I have never agreed with the Kantian idea that the moral is necessarily reciprocal and universal. Deontology, the general logic of ethical forms, cannot be presumed to consist simplistically of exclusively categorical ethical-mode statements, but must consider a complex intertwining of conditional statements. Just as the non-ethical aspect of nature displays diversity and conditionality, as well as some uniformity and categoricality - so may the ethical aspect of nature (to the extent that it exists), and all the more so God-given ethics, display these various modalities.

Furthermore, in both natural and religious ethics, conditioning may be of any category and type of modality: it may be extensional (schematically: 'in the case of this class of people, thusly; in all other cases, otherwise'), natural/temporal (e.g. 'when a *nazir* eats a certain quantity of grapes, then he is subject to certain penalties'), or even epistemic (i.e. 'if a person was aware of so and so, he is responsible for such and such; alternatively, not'). The search for

absolutes (for an ethic which can be proved with certainty) must not be confused with a pursuit of categoricals.

Of course, where no truly convincing cause for discrimination is available, one is logically bound to revert to the idea of reciprocity and universality (known to philosophers as the Principle of Uniformity of Indistinguishables). Such positivism or minimalism is often justified and inevitable, at least within a natural knowledge framework; and indeed it is applied in the religious context, where the text of reference has not specified any distinctions to be made. For in such cases, legal differentiation between people and lack of equity (equality before the law) would be arbitrary and unjustifiable.

But, where religious ethics is concerned, our attitude is that if God, the Creator of all fact, including ethical fact, chooses to subdivide responsibilities and structure reward and punishment in uneven ways, and communicates His will in this respect to us, that is His prerogative, and we are bound to comply. The reason for this attitude is not necessarily that there exists a cause for discrimination invisible to us though visible to God (though in some cases, this may be true), but that God is free to assign different functions and wages to His various workers, however indistinguishable they be in their natural or spiritual characteristics. He is the Boss.

> However, the said viewpoint is difficult to accept, at another level, for someone in modern democratic western society, at a time in history and in places where the experience of the totalitarian oriental or medieval monarch has thankfully virtually disappeared. Our society is very permissive and liberal (and nevertheless, thank God, it is not totally and extremely amoral or immoral, and is even in many respects more moral than ever before). This stance is the product of a development, which has even been noticeable within the space of my own lifetime, but has its roots far in the Enlightenment (including, to some extent, Immanuel Kant, but many others too) and subsequent philosophical and political events.
>
> It is hard for us to accept, as the paradigm of morality, the behavior-pattern of a frightened slave, doing his assigned duties with nothing in it for his or her self, simply because the master commanded it threateningly, thinking only as far as necessary to fulfill the command, and so forth. We want to understand things more, we expect fairness more. Selfless submission and pure obedience seem to us to be remote theoretical constructs, inventions of austere and insensitive moralists; they no longer seem so beautiful and ideal. Such attitudes must be taken into consideration.

What I want to discuss here is whether an externally imposed course of action, Divinely commanded, to be sure, but done in the way of a duty, is morally higher, as norm-setting Judaism seems to suggest - or whether a person is more credibly moral who acts from a deep internal intuition of right and wrong, spontaneously, without being forced to, out of genuine love for the world, for fellow creatures, and for God. More simply put, the question is really: who is the nicer guy, the one who gives you charity or who doesn't kill you, just because he has been so commanded - or the one who gives you charity or who doesn't kill you, because he himself loves you?

Bound with this issue is that of the actual psychology of religious study and observance, which suggests that the answer to our question varies from case to case. For there is surely a difference, for the most part, between the motivations religion ideally demands of its adherents in theory, and those which actually move them in practice. And while religion views this gap hopefully as a passing phase, which it is precisely the job of study and observance to close - we must linger on it more attentively. We must ask, what *in fact* makes

most religious people act as they do, i.e. in apparent accordance with the precepts of the religion.

And the reply cannot be that such people have at the outset the same value-judgments as the religion. It may be that they do, if they happen to have been culturally prepared since youth to that effect, though this does not prove that under other influences they would not have acquired other values and convictions. But in any case, new arrivals to the religion, whether Jews doing *teshuvah* (return) or *gerim* (converts), while they may have out of personal life-experience acquired some values and convictions in common with those proposed by the religion - enough to draw them to it - new arrivals, I say, are systematically *acculturated* and made to acquire desires and beliefs they previously lacked.

Thus, while the initial motives drawing a new arrival may have been the desire to escape painful experiences, like loneliness and confusion, or more positively the desire to gain an edge in a competitive world by receiving the favour of the Ruler of the world, or perhaps even simply getting material help from the Jewish community - the religion induces new, additional desires in the newcomer, as its condition for belonging to the group, which may include various material, psychological, familial, national, political and spiritual desires. For example, the newcomer may have no initial interest in the world to come or the messiah, but the religion gradually makes him believe these are his own most fervent wishes, and even that they always have been.

Objectively speaking, at any given time in a person's spiritual development, some aspects of his indoctrination have become internalized, and others are still essentially at an artificial level of pretense or mimicry, while yet other aspects are still being rejected. Whereas in the case of role-play a distinction is possible between the subject and his response or behavior pattern, in the case of an internalized doctrine such an objective distinction is rather difficult to make. The difference between traits and habits acquired, on the one hand through the natural process we call "experience", and on the other hand through the social process we call "indoctrination", becomes at some point academic - except insofar as or to the extent that the method of influence used involved violence or conscious lies, so that the subject was forced or tricked rather than a voluntary participant.

Similar doubts exist even with regard to the person motivated to virtue by non-religious forces. While good deeds (or restraints), like acts of charity (or non-violence), may have external resemblances, their internal roots vary widely, from mean and ugly ulterior motives to beautiful, uplifting examples of sincere human love and siblinghood. It would be unfair to assume only negative subtexts, and naive to suppose only positive ones.

For these reasons, it is not clear to me why some Rabbis insist that good deeds (or restraints) based on purely secular motives are automatically suspect. I find it hard to believe that human nature is intrinsically evil and lowly, when without explicit Divine guidance. Rather, I think that humans have an innate minimum of morality, expressed in various ways and different in degree from person to person, which it is difficult for them to fall below. Often, to be sure, an individual's 'minimum of morality', the limits he/she will not pass no matter what the stress or temptation, has cultural roots (which may indeed be ultimately religious), but it is there all the same.

A conformity, however superficial, with the law (whether the 7 Mitzvot for non-Jews or the 613 Mitzvot for Jews), is still respectable, even though deeper accord with the spirit of the law is always more admirable. The Rabbis argue that when a law exists (or, rather, is

known or thought to exist) the 'evil impulse' to resist it is greater, and therefore the obedience of the law is all the more commendable; whereas, actions (or inactions) performed against no such resistance are almost worthless. This may explain why one should rather do right in obedience of a law (applicable to one) than for personal motives, or why a person to whom the law was applicable is more creditable than a person to whom it was not, though both obey it. But in my opinion such argument has only comparative force, it cannot be taken to the extreme.

In brief, even though we can formulate a typology of the more desirable and the less desirable motivations, differences between motivations are in practice often blurred and moot, and it is difficult to judge without prejudicial type-casting just where each person stands.

A person who is well-practiced in the art of self-knowledge may in the limit have a good idea of his/her own motivations; but understanding other people is much more difficult and mostly a guessing game. For our judgment is highly coloured by our level of tolerance and love, for ourselves and others. People who habitually judge themselves too harshly will tend to judge others just as or even more harshly; those who are overly complacent with themselves may either be equally so with others (to excuse themselves) or nevertheless judgmental towards others (using double standards).

The true conclusion is that human beings are not like material objects, definitely this or definitely that, their character traits are indefinite - a 'was somewhat', a 'seeming to become', a 'tending to be', rather than a being. It is not always clear just what they are - not merely to us, the subjective or objective observers, but in reality, in fact.

> While on the subject of harsh judgment, I would like to comment on an indecent mode of thought some religious people engage in. I refer to the tacit suspicion of every victim, if not every sufferer. They think: 'if God is just, then every victim/sufferer must have committed some crime/sin in the past for which he/she is thus punished'[289]. In this view, there are no *innocent* victims/sufferers, and all pity is misplaced, all compassion gratuitous; misfortune becomes *proof of* hidden fault!
>
> It does not seem credible that God would use a criminal's misdeed as His instrument for the punishment of the victim: that would imply that, even while condemning such crime, He is in a way an instigator or accomplice of it, and the criminal is in the service of justice! No: crime must be viewed as a person's initiative, entirely disapproved of by God. God may *ex post facto* balance the victim's ledger a bit, but He had no need of the crime for that. We might more credibly regard natural misfortunes as God's doings for purposes of justice; but even that is, I think, simplistic. Just as God *lets* crimes take place, so (or all the more so) He *lets* natural misfortunes occur.
>
> Sufferings suggest *a distance* taken by God, letting the human drama unfold within certain parameters, usually without interference. (Why such negligence and how to reconcile it with justice, I do not know.) There are *some* evident causal connections between sufferings and previous misdeeds, but very often (as e.g. with the *Shoah*) credible explanations are lacking. Balancing of accounts must be a later matter, after life (if at all). That seems to be the only empirical and reasonable viewpoint.

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289 There are hints of this view in the Talmud. In Hindu/Buddhist philosophy, the argument refers to 'karma', and presumes a victim to have committed a *similar* crime in a past life, if not the present one. But this presupposes an infinite regression; crime must have started somewhere, sometime.

14. LOGICAL ASPECTS OF *EMUNAH*.

Here, in conclusion, we shall examine some of the logical difficulties and paradoxes in the concept of religious faith.

1. On Natural Proofs of Religion.

In discussing the logic in religious documents like the Bible or Talmud, we have had no occasion to consider what philosophers call "proofs of God". The reason is simple: the pursuit of such proofs is not a religious phenomenon, at least not originally, but a concern of secular philosophy (specifically, the branch called theology). The Torah's proofs of God are implied in the epiphanies and acts of God that it reports, like His appearance to Moses in the Burning Bush or His division of the Red Sea. When the prophets argue on God's behalf, they do not use abstract philosophy, but refer to Biblical events which are taken for granted. Similarly, the Talmud takes off from the Biblical document without critically questioning its origin or contents. Nevertheless, nowadays theological discussions inevitably linger on natural proofs of religion. The modern mind requires it.

It must be said at the outset that there are no unassailable proofs of Judaism's beliefs; nor are there disproofs. Every known argument, one way or the other, has a rebuttal. Unless we are each personally and constantly in the Presence of God, we are bound to have to rely on *faith*; and lacking such experience, our reason also cannot with certainty deny its Object. The main characteristics we attribute to God in our thinking, our 'definition' of him as Existent, Unitary, Unique, Omnipresent, Omniscient, Omnipotent, Creator and Master of everything, perfectly just and merciful Judge, providential and gracious, and so forth, are all intellectual and emotional projections (constructions largely based on Torah data, to be sure), which ultimately depend on acts of faith.

These comments apply equally to Christianity, Islam, and other monotheistic religions. As for systems like Hinduism, Taoism or Buddhism, they too contain unprovable and undisprovable beliefs, like the idea of karma or the notion that liberation is possible (by means like meditation or whatever). In every religion, there are certain starting points, which one may choose to accept or refuse; logic becomes used in them only as from those points of departure.

Consider, first, the most natural of arguments in favor of belief in God. Looking around one at the world, one is bound to marvel at the miracle of ***existence***, at the fact that *anything at all* exists, and furthermore at the degree of ***variety, order and complexity*** of what exists, not to mention the wonder of ***our consciousness of all that***. This general miracle, which seen daily passes unnoticed, is surely more impressive than any particular miracle, like

the Splitting of the Red Sea. Where did all this come from? It could not always have been there! Who made it happen? It is too fancy to have happened "by chance" and "*ex nihilo*" (even supposing the concepts of chance and nothingness at all meaningful)! Thinking thus, one may easily infer: yes! There must be a God, powerful and conscious to a very high degree, who created all this, the miracle of Nature.[290]

However, convincing as this argument may seem[291], it is easily rebutted. For we can similarly argue that if this universe we experience is a marvelous thing, *how much more* marvelous is an Entity capable of creating it! Our initial argument posited God as an explanation of the surprising phenomenon before us; but upon reflection we must admit that we have thereby given ourselves an even more complicated problem to solve[292]. We could therefore argue: **if the world requires explanation, how much more so God; and if God requires no explanation, how much less so the world**. In brief, our intervention has only been briefly satisfying; the initial problem remains essentially unsolved; if we achieved anything, it was to complicate matters further.

Thus, whether we refer to the existence as such of the world as a whole (positing a cosmological argument) or to the variety, order and complexity of its parts (a teleological argument), the logical impact of such ontological arguments is identical - nil. We may through such reasoning make the interesting discovery that matter may have been created *ex nihilo* by a spiritual Being, but that does not provide us with a *final* explanation of things. The existence and power of the Creator remain a formidable mystery[293]. In any case, note well, such neutralization of the argument does not prove anything against the idea of God; it merely signifies that the proposed course of reasoning is not logically conclusive.

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290 This sort of intellectual pursuit of the First Cause, is found in Greek philosophy. One Talmudic version is the story in Midrash *Genesis Rabbah* (ch. 38), according to which the patriarch Abraham arrived to a knowledge of God by reasoning backwards from each thing to its cause. The argument has often, in philosophy, been understood as based on the idea that everything has a cause, therefore so must the universe have one; but such an idea is consistent only if we accept that of infinite series, which is rather difficult to accept, and which in any case if accepted would exclude acceptance of a first cause. The version more commonly found today appeals rather to the need to explain the improbable *fact* and *richness* of existence; it refers to complexity as much as to causality.

291 And I can testify that there have been times in my life when this has been the only convincing argument I had left to offer myself!

292 As for the belief, found in Hinduism and Christianity, that God has appeared in human form (incarnation), it does not merely present a more difficult technical problem; it is rather an unconscionable concept: how can a container contain itself? If at all, such appearance would have to be postulated as a projected illusion, a sort of holograph, at best; it cannot be proposed as a 'real' material body like that of human beings.

293 Note that the argument is often misconstrued as an attempt to explain matter. But it is not so, essentially; for the mind (consisting of the stuff of our inner experiences and the soul we seem to have) is just as fascinating an enigma, if not more so. The problem is more broadly: *existence*. In this perspective, we may say that Judaism, which conceives of an eternal spiritual God, preceding and outlasting all matter, and Aristotle, who conceives of an everlasting universe, including God and matter, are basically in agreement with regard to the eternity of existence as such (for the former, with regard to God's existence only; for the latter, more broadly). This is ironic, considering how some commentators present these doctrines as in radical conflict; they are in disagreement, but only in relation to the issue of matter's longevity. A truly radical counter-thesis is the claim that existence suddenly appeared spontaneously out of non-existence; some people apparently believe that. But the way the latter thesis is 'imaginable' should be noted: we visualize the event like a cartoon on TV, the screen is at first empty, then 'pop!' a universe appears from nowhere; however, there is a screen to begin with, and there may be invisible events behind the screen.

An alternative philosophical approach to the issue, is epistemological rather than ontological. We may ask the question: what *would* in principle constitute definite proof for or against each of the tenets of religion; what would it take to convince us firmly? For instance, with regard to the existence of God, one might assume that some manifestation of Divinity, such as a great light or a very unnatural occurrence, would firmly convince any empiricist.

However, it is conceivable that even under such conditions, once the surprise is over and one has had a chance to think again, one may even doubt one's vision! Normally, we do not doubt any experience unless we have cause to, due to some conflicting experience; however, the intellect is always capable of skepticism and might be able to find some excuse for it even under the conditions stated[294]. We may consider this scenario as acceptable to the Torah, since we know from within it that even after witnessing extraordinary events such as the Exodus from Egypt or the Giving of the Torah at Sinai, there were individuals who evidently, as their deeds demonstrate, had doubts concerning the reality or significance of these events.

With regard to the characteristics of God we have mentioned, other than Existence, the following comments may be made. Most of these concepts encapsulate some logical perplexity. How may God have many attributes and powers and yet be one? Some, like Maimonides, try to bypass the issue, by saying, His oneness is something different from the unity of any thing in the natural world, it is unique; or, by claiming (contrary to the Torah's practice) that we can only describe God by means of negative propositions, saying what He is not (not plural, not finite, etc.). But these are artifices, which do not really resolve the paradoxes. God as both transcendent and immanent, the uncreated creator and unmoved mover of everything, all-knowing with an inner and outer perspective, all-powerful with unsurpassable control of events - all these concepts are *extrapolations of natural powers and events to an extreme degree*, but we have no experience of them nor capacity for it.

How can a human, not him/her self knowing everything, *know* that God knows everything; how can a human, in whose experience all powers are finite, *know* of an agent of will capable of doing anything it wants? At best, what is involved is a Walt Disney imagination, without attention to detail. The definitions of such limitless concepts are unavoidably *mere juggling of words*, they refer to nothing we have real knowledge of. Indeed, the concepts are *fraught with logical problems*. Can an omniscient being conceivably know that he is omniscient? he can only assume it, for there may well be something beyond his ken he is not aware of[295]. Does omnipotence include the capacity for self-creation ex-nihilo? the idea is unconscionable. How are we to conceive God as being everywhere, the being and sustainer of being of all material, mental and spiritual existents, the container of the whole universe, and yet somehow not get into pantheism, as did Spinoza?

And so forth - my purpose is not here to exhaust the issues, or cause loss of faith, but merely to point out that any attempt to rationalize our standard ideas about God is a display of naivety. Better to humbly acknowledge the difficulties involved and our reliance on faith.

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294 Hypotheses circulated in recent years to explain the Sinai experience include, for instances, references to psychotropic substances, or technological gadgets, or visiting extraterrestrials.

295 Of course, *by definition* (deductively) an in-fact omniscient being knows his omniscience. But the problem is at the inductive level, gradual development. More needs to be said on this and similar issues.

To conclude this topic, then, we must say that reason can order and make consistent our thoughts concerning God and other religious beliefs, but it can never definitely prove them. It is vain to seek actual proof. There is no escape from the necessity of *emunah*, faith. Faith is essential to freedom of will and moral responsibility: if the moral act is done under the compulsion, as it were, of mere logic, the human being loses his special status as decider. To say this, is not to provide a sort of transcendental proof of religion - but is merely an explanatory perspective, proposed from within religion, after its acceptance. The undecided are not logically compelled by it, but are still free to choose for themselves whether **to believe or not to believe**.

Furthermore, it must be noted that proof of God would in no way entail proof of the rest of religion. Given that God exists, there still remains the issue as to *which religious document, if any,* is to be relied on as God's message to us. Is it to be the Torah, the Gospels, or the Koran, or the Baghavad-Gita, for that matter? An additional act of faith is required here too! Furthermore, granting the choice of the Written Torah as a whole (in our case)[296], a *multitude* of additional acts of faith are required to believe in the Oral Law (the Talmud and subsequent Rabbinic developments). *Every* law, attitude and story in the Bible and subsequent religious literature, is a complex of separate beliefs, requiring a new act of faith. Washing the hands in the morning, the *nidah* going to the *mikveh*, as much as belief in invisible entities (like angels), acts (like Divine judgment) and domains (like the World-to-come) are bundles of acts of faith.

The demand for proof of God becomes, in this perspective, merely the beginning of an infinite process. If we awaited the answers, refusing faith, we would never find the time to enter religion...

2. Theodicy and the Believer's Wager.

In any case, in practice (we must keep insisting on this point), people do not become religious on account of rationalistic arguments, but for more visceral motives. Good philosophy tries to abstain from extreme rationalism, and while it tends to frown on confused anarchism, it is open to considerable speculation and intuition. But religion allows the irrationalism in us, our instinctive deeper yearnings and emotional responses, greater freedom. This is, I think, its human dimension; it makes us more than machines.

> To be sure, the extremes of religion, 'fundamentalism', or more precisely 'integrism'[297], are to a large extent products of an excessive rationalism (in a pejorative sense of the term - it is the

296 Which is not an easy feat, in view of its lack of system (why would God's historic statement to humanity be so disorderly, so 'unprepared'?); and the many apparent inaccuracies and inconsistencies in it (those noted by the Rabbis, and those ignored by them); not to mention the disproportionately large place given to apparently minor matters, while major issues are glossed over or totally ignored. But a critique of the Torah is not in order, here: the present work takes it, as much as possible, as the point of departure.

297 *L'integrisme*, a French word which seems to be becoming English. It is handy because it describes the total empire religion may have on its adherents, dragging them into ever more

rationalism of simpletons), which explains the severity they have historically very often implied (their expressions, particularly the violence, are of course irrational).

What makes people religious in practice are banal things like hope for happiness on earth (which is gradually transmuted into hope for life in a thereafter), hope for better human relationships, hope for understanding, love, harmony, a woman or man, children; also, the release from fears, protection from the hardships of life, and of death, release from guilt and from uncertainty, absolution and guidance. (These are very broad brushstrokes, but you know what I mean.) Religion makes promises and threatens, capturing ready victims and then spinning an ever tighter web around them, with expert moves and the help of its victims themselves (these words may sound harsh, disillusioned; but this is a view, which has some truth). Religion has psychology, it knows what moves people.

The human being has his or her own intuition of justice. It is not in all people identical nor of equal intensity, but it is the source of their ability to at all grasp the concept. This personal intuition of justice may be influenced, one way or another, by religious or other doctrines - cultural influences may cause a rationalistic or even forcible reconstruction of the instinct in an individual - but epistemologically it precedes them and antecedes them. The concept of justice, then, is in all individuals the result of a compromise between personal insight and socio-cultural pressures, whose power over the individual depends on the particular combination of desires, fears and guilts which at a given time determine his or her susceptibility.

All this has apparently little to do with God, but rather more to do with psychology and sociology! But in truth, since religion takes up so firmly the idea of God, we tend to associate the two, and usually think distancing ourselves from the former necessitates distancing ourselves from the latter. Belief in God is theologically conceivable without belief in a religion; many people have tried to opt for this middle ground. But in practice the link is rather strong. Resistance to religion arises to the extent that, or as of when, the promises or threats it makes are regarded as empirically untenable.

What is it we expect from God when we ask him for justice and mercy? *Justice*: that we and our loved ones be rewarded for our good deeds and that our enemies be punished for their bad deeds and be deprived of graceful gifts. *Mercy*: that we and our loved ones be given gifts of grace and be forgiven for our bad deeds. When our hearts feel generous, we understand that God may reward good deeds of our enemies and occasionally forgive their bad deeds. All this is a basic instinct of humans. On this basis we may pray for our protection, our sustenance, our happiness, and so forth.

Of course, the concepts involved in such general or specific prayers are complex. There are many aspects, levels and degrees to them.

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demanding commitment. Its connotation is, however, especially political; the terrorist tactics of various Islamic fanatics or absolute theocracy of Iranian *ayatollahs* (clergy), which we currently witness daily in the news, sadly come to mind. The term is still accurate in this context, suggesting totalitarianism, the desire of some to have *everyone* else follow their path and to control *all* aspects of their lives. 'Fundamentalism' rather indicates the level of *text* the adherents refer to for their beliefs; i.e. a certain naive and superficial approach to textual exegesis. Behind the intolerance, which is also to be found to some extent in today's Jewish world, is the severity towards self seemingly demanded by religion (and other puritanisms): this is what causes us to look at others with hardness.

> Good and bad may be spiritual, mental, physical, emotional - or political, social, economic or environmental or even esthetic; and may be so to various degrees, directly or indirectly, and categorically or conditionally. One may cause good or bad to God's designs, or to oneself, to other people (individually, in groups or as a species), or even to animals or vegetation (individually, in groups or as species)[298]. Furthermore, there may be harmonies and conflicts between all these domains - they impinge on each other, naturally and logically, in various ways, and hierarchies must be set up or identified. Additionally, our perceptions come into play: the objective status of a value or disvalue is often moot or irrelevant, and our subjective intuitions of them may have more impact.
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> Likewise, friends and enemies may be real or imagined. These notions basically refer to the benefit or harm other people cause us (in the various ways just mentioned). But motives and emotions are involved in such evaluations: issues of love, hatred or indifference, sincerity or insincerity, on both sides. There are friends or enemies in fact (by virtue of objective impact) and those of intention (referring to whether they affect us one way or the other deliberately, incidentally or by accident).
>
> We assume and hope God, the Judge and Arbitrator, sorts all these factors out, and delivers and enforces a fair decision.

Appeal to God presupposes a belief in good and bad. Zen will say that good and bad are linked, and its adepts try to see the world neutrally, without such dualist concept. It is true that the *thought* of good automatically gives rise to the *thought* of bad - or at least, absence of good - by way of *outline and contrast*. Logically, the concepts can be grounded in relation to a standard of value, which merely 'passes the buck' to some arbitrary norm, unless universal values can be identified. But actually, within human beings, these concepts, good and bad, are very difficult to pinpoint; they are vague, variable, and often inconsistent. It is more in the way of an instinct, or at best an intuition of appearance, that we conceive good or bad to apply to something. This is one of the peaks of our conceptual faculty, this discerning of the unwordable, but no less valuable than sense perception. It is the dignity and decency of humans.

In relation to God, what humans seek, and what makes them enter and practice religion, is a set of rules to the game of life, which, if they adhere to them and perform certain things (in the largest sense), it will be well with them as they wish; and if they do not, they may expect negative consequences. It is *a deal* we want to believe in, and are willing to pay for (whether or not we admit our mercantilism). It is a rationalist demand for a comprehensible world in which good and bad are each put in its place. Religion comes along and promises just that, an orderly causality (this is in the case of theist religions - in the case of religions like Taoism and Buddhism the offer is different, an escape by transcendence from the good-bad dichotomy). One accepts the doctrine hopefully, and *tries to perceive the world in the prescribed way* so as to obtain solace.

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298 With regard to the mineral world, the issue is debatable. We ordinarily consider concepts of good or bad as applicable to such objects only in relation to living creatures, or eventually to God. One might however say, more absolutely, that the destruction of even a stone, is "bad" for it, or that a gem or a work of art or a technological marvel has an intrinsic "value" as an apogee of the universe. But within such a notion, there would be no degrees or conditions. The good of a thing would be its unchanged existence; bad for it would be any modification in its being, at which point it would be *another* thing, which in turn would have only either-or value-relations to events. As for God, Whom we conceive as indestructible, and even unchanging (although a Free Agent of change), the concepts of good or bad are inapplicable to Him personally; at most we can say that whatever He wills is good, and whatever He wants us (to whom He has allotted some measure of choice) to will - is good, and not-to-will - is bad.

Difficulty may arise after a long apprenticeship, when one finds that the rules we were promised do not hold, and the sequences of good and bad in our lives, whatever they be for each individual, do not necessarily adhere to the promised program[299]. At this point, religion proposes transcendental domains - heaven and hell[300]. A perception of events contrary to the expectations raised by the religion, together with a conviction of having played the game by the rules, may cause a breakdown of faith and the abandonment of religion, or parts thereof. But a vacuum remains, if the world continues to seem irrational - a need for fair-play unfulfilled.

The *Believer's Wager*[301] is that God exists, and that his or her particular choice of Religion (or even his/her personally designed religion, or variant of an established Religion) is the correct one for himself or herself. It is a wager, because the refusal to make a leap of faith, is itself a leap of faith, into something which must be evaluated too:

- What if my religion is **true**, and I abstain from following it - will I get hurt and/or will I miss goodies?
- And what if my religion is **false**, and I do follow it - will I mess up my life and/or will I waste it?
- What of **other** belief-systems on the market - how do they compare, in terms of credibility and efficacy?

There is a wide-ranging calculus in the decision, which may be referred to as the essence of *theodicy*, but ultimately *some* leap of faith remains unavoidable, in whatever direction it be.

3. Faith and Justice.

There seems to be a logical conflict between the concepts of faith and justice. We have shown earlier, and I think every serious thinker readily admits, Divine law cannot be proven by experience and reason, but rather depends fundamentally and in larger measure on pure faith, i.e. on *willed belief*. If so, how can such law, which inherently in its claim of origins contains a doubt concerning its own validity, be justly viewed as binding on people who lack faith in it, or even on people who have faith in it, to the extent of making them liable to punishment by human court or by God if they do not obey it?

It has only gradually dawned on me that the concept of Divine law arrived at by open philosophical inquiry - that of an ethic based on respect of Torah tradition, mixed with

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299 In this context, it is worth quoting George Santayana (d. 1952): "Fanaticism is described as redoubling your effort when you have forgotten your aim". It is clear that not everyone reevaluates their ideological loyalties.

300 Incidentally, the idea of hell is said to have originated in Zoroastrianism, a dualist religion of the 6th cent. BCE which still has adherents. See Roberts, p. 169.

301 This is called *Pascal's Wager* in histories of philosophy; but since I thought of it independently and I am sure others have, and a more descriptive name seemed worthwhile, I have renamed it.

attention to factual experience and use of rational faculties - is very different in character from the concept of mitzvah manifest in the religious population and culture at large. For the hard-core orthodox Jew, the law makes absolute and incontrovertible demands; no understanding or tolerance for those who deviate from it *out of doubt* is *in justice* possible, only if at all at best *in mercy*.

On the one hand: Rabbinic authorities recognize that religious observance strongly depends on faith, as evidenced by constant exhortations to *emunah* - and faith logically implies doubt; and on the other hand: it is a principle of justice, given to at least some extent within the Talmud itself, that doubt relative to a law exempts one from judgment under that law. Yet the radical tension between these two positions seems to have gone unnoticed.

A similar contradiction can more easily be avoided under a system of "natural" jurisprudence. In the latter case, most of mankind, or (more precisely) most of a particular society or group of people, experiences revulsion or fear in relation to certain behavior patterns, and the wish or need to demand of its members certain other patterns. It therefore imposes its collective will, enacting laws and setting up ways and means for their enforcement. It does so without having to *prove* its abstract justice - though it may explain itself pragmatically, with reference to the common welfare, in order to approach a consensus and promote voluntary compliance.

Under a system of 'religious' jurisprudence, however, the basis of law is, rather, the alleged will of God, and a claim to absolute justice would seem necessary. For one would expect, in a rationalistic perspective, that whatever the Creator chooses to regard as just - and give us as His law - must indeed be just; even an abstract concept like justice can logically have no existence or reality not endowed it by the Creator of all things. But, in a more humanistic perspective, justice is whatever human beings in general experience or intuit as just, it being after all they who will be on the receiving end of any blows the law may entail.

In any case, our sense of justice, and the views proposed by the Talmud as of Divine origin, would seem to concur that *doubt mitigates law*. Various pleas of this kind are possible:

- one can plead innocence and claim a doubt that the accused A in fact broke the law L - or a doubt that the court/judges know or can know that A in fact broke L;
- one can plead ignorance and claim a doubt that the accused A knew that L was law, or that it applied in the situation concerned - or a doubt that the court/judges know or can know that A knew L was law, or was applicable;
- one can plead liberty, and claim a doubt that the law L is a Divine law - or a doubt that the court/judges know or can know that L is law;

With regard to the first category, Jewish law relies on the testimony of reliable witnesses coupled with circumstantial evidence to remove reasonable doubt (though, is there not usually a small drop of doubt left?). With regard to the second category, Jewish law requires the forewarning of the criminal just prior to the crime (though, what if he disbelieved them?). With regard to the third category, the most radical objection, the court can always in practice pursue judgment notwithstanding such doubts, on the basis of natural jurisprudence (that is, social necessity and power). Modern law, in the 20th century Western countries, follows more or less similar lines (very broadly speaking, of course).

If any and every degree of doubt was taken seriously in practice, in the name of an ideal of perfect justice, there would be total anarchy, the antithesis of the rule of law which makes justice possible. Nevertheless, our discussion here is not about realistic wisdom, and what precisely to regard (or not regard) as extenuating circumstances, but perhaps a logical critique of fierce fanatics. There is sufficient cause for doubt, it seems to me, in any ethical/juridical doctrine, to exclude the justification of extremely judgmental attitudes and blind hatred, except of course where obviously heinous crimes have been committed.

Although doubt and justice are somewhat in friction, some uncertainty would seem to be essential to the operation of human freewill, on which the concept of justice depends; and so in some respects justice is fundamentally impossible without the existence of doubt. This paradoxical unity in duality may be illustrated in the following remarks.

If, as some commentators seem to claim, Divine judgment occurs through the operation of an actual Heavenly Court, in the presence of the accused and with a chance for him to defend himself, why do we never remember it? In earthly justice, a prison inmate knows why he is there (ignoring Kafkaesque situations); but, in Divine justice, the sufferings we experience in this world (I do not know what happens in the next) are rarely understood by us, and even if we feel guilty about this or that past deed, and guess that maybe our sufferings relate to such past deeds, we never remember an actual trial up above. Perhaps, simply, the uncertainty is part and parcel of the punishment; we surely do not worry about it when it is good things that are happening to us.

Why is reward/punishment for virtue/vice not immediate? For if every moment is a new creation, as some commentators claim, it would seem that the person concerned is not one and the same individual today (at the time of the deed) and tomorrow (at the time of its retribution), but at every moment a new creature. Indeed, often we sin with selfish and cavalier disregard for future consequences, regarding that future person as another than oneself. But evidently, Judaism does not see this issue as a major problem, and explains the delay granted sinners as Divine mercy designed to give him time to repent. And the delay of reward? perhaps to accumulate credit for bigger and better things!

A thought I had in Tsfat, in the summer of 1991, during a study of Moshe Cordovero's work, *Tamar Devorah*. The question I had posed was: if God keeps the sinner alive to give him time to repent, yet God knows the future and so knows in advance who will repent and who will not, why does He keep the latter alive at all? The answer I had proposed was as follows: if God did not keep the impenitent sinners alive, then all those remaining alive could assume themselves to be future penitents, and would be less in a hurry to improve themselves. Similarly, with regard to the doctrine that sinners are rewarded by God in this world so that He owes them nothing good in the next, while nice guys and gals are treated harshly in this world, so that God can give them only good in the next - if this principle were applied consistently and exclusively, one could draw inferences from people's happiness or suffering.

In brief, then, *God has to confuse the issues and cloud things, in order to maintain the doubts and mystery which make freedom of choice possible and willpower necessary*.

4. Legislated Belief.

The Judaic concept of legislated belief is hard to understand. I know that similar objections have been put forward by others in relation to laws commanding love (as in "love the Lord your God"); though it is clear enough to me that while one cannot force oneself to love at will, one can perhaps over time by sensitive behavior teach oneself to do so. In contrast, belief is something more fundamental from the epistemological point of view.

Human belief and knowledge naturally arise through the collective impact of perceptual and conceptual appearances. Concrete and abstract phenomena present themselves to our consciousness, and over time we try to sort them out (compare and contrast them) and make sense of them (weed out contradictions, interrelate data, and fill gaps). At any given moment in one's life, one cannot honestly *ab initio* characterize any given appearance, viewed in isolation from its contexts, as a 'reality' (or truth) or an 'illusion' (or falsehood). It is only within the *total context* of all phenomena one has encountered that one can evaluate any one of these phenomena, and consider it as part of reality or as a distortion thereof, or as still problematic. And of course, since the context is *continually changing*, these evaluations vary with time and can be reversed.

The naive mind, the person who has not reflected on epistemological issues, just takes the processes involved for granted, and believes whatever he/she happens to believe, moved by the natural impact of impressions, including those determined by emotional forces and those emanating purposely or unintentionally from the surrounding society, or from particular milieux therein, to varying degrees. To such people (and we all to varying extents fall in this class) there is no clear distinction between belief and knowledge. Or, more accurately, for such people, knowledge is more determined by belief, than belief is as it should be by knowledge.

To a philosophically inclined person, knowledge is like a fragile plant, something which changes and grows and must be delicately nurtured and taken care of. There is never any question of anticipating reality, other than gently and tentatively; one may well ask questions, but one listens to the answers, patiently letting reality speak for itself, reveal itself, at its own pace. At no time does one consider the way things present themselves to be final, or try to force such phenomena to remain rigid or to move certain ways rather than others.

But some people, through pain, cowardice or laziness, try to impose on themselves (or on others, by means of political, cultural or religious dictatorships) certain beliefs; and they illegitimately label these "knowledge", stealing a word which does not apply.

Belief differs from knowledge in that the former is to some extent an attitude, normally determined by the natural force of presentations, but also capable of being 'taken up' as an act of will, in which case we call it "faith". Knowledge, in contrast, is a more normative concept, signifying that the proposed result did not arise through mere natural inertia, and certainly not through forced belief (whether against reason and experience, or in their interstices or beyond their horizons), but was to some extent pondered, developed with reference to logical standards, validated as far as possible in the given context. Thus, belief might be viewed as a more generic concept, which includes everything - faith, emotionally-determined belief, externally-imposed belief, common/naive knowing and scientific knowledge. The latter two differ only in degree of reflection they imply.

In this perspective, direct revelation refers to extraordinary presentations of phenomena by God to certain humans; and prophecy is the kind of consciousness associated with such special events, be they verbal or include sounds and images, whether seemingly occurring in the external domain or dream-like. Indirect revelation is the report or hearsay about such phenomena. Whereas direct revelation naturally causes belief, and is in principle a fully legitimate source of knowledge, indirect revelation is more of an issue in these respects, and requires more careful evaluation. Some people believe in indirect revelations easily (particularly coming from certain teachers they trust), while others take convincing and still others are skeptical on principle.

Now, Judaism (and similarly other religions) includes, not only a certain "belief-system", but a number of commanded beliefs. For instance, Exod. 20:2 ,"I am the Lord your God", is interpreted by the Rabbis as a Mitzvah to believe (constantly) in the existence and various attributes of Hashem (e.g. sovereignty, mercy, justice), and His various powers and achievements (e.g. creation, providence, liberation from Egypt, gift of Torah). Similarly, the Shema Israel, Deut. 6:4, is a Mitzvah to believe in Hashem's utter Unity (despite the apparent plurality and variety of His attributes and actions in the world). There are also negative commandments relating to belief - such as Exod. 20:3, the Mitzvah to disbelieve in idols or gods other than Hashem, and Num. 15:39, "and don't go touring after your heart and after your eyes", which is interpreted as a Mitzvah to avoid heretical thoughts and immoral fantasies.

This is hard to understand, from a logical point of view. Normally, what one conceives as having-to-be-done is determined by what one wants to achieve (one's purposes, or more broadly, values) and by the information at hand concerning relevant causal relations (which tells one what means are likely to lead to one's ends). In the construction of a natural ethic, neutral (or alethic) propositions logically precede all normative propositions; there cannot be normative propositions *about* factual beliefs, *for if a thing is already commonly known as true, an imperative to believe it would be logically redundant (except for a general call to intellectual honesty), and if it is not evidently true, then there is no informational basis for an imperative about it*.

Perhaps that is why the Torah simply says "I am the Lord your God" and "the Lord is One", in the way of announcing facts rather than in the way of commanding beliefs. As for the above-mentioned command concerning idols, it says literally "you shall not *have* gods other than Me"; it does not refer explicitly to belief, but seems rather to warn against certain behavior patterns. Lastly, the passage about the 'heart' and 'eyes' is rather vague, and might well refer to actions *following-up on* heretical lines of thought or immoral imaginings, rather than primarily to any cognitive processes.

In other words, the view that such Torah statements are commands to believe or disbelieve something is not inevitable, nor really logically tenable. Rather they must be viewed as positive or negative commands for certain courses of action (other than beliefs), which logically follow from having certain beliefs or tolerances. In this way, *the mind* retains its intellectual freedom, which is the precondition of its honesty and sincerity, and which is a facet of its dignity - and yet the person is in no way freed *in action* from the ethical obligations and prohibitions the Torah imposes, such submission to God being also a facet of human dignity. Liberalism is not necessarily libertinism.

We could conclude here, and say the following. The intent of the codifiers of such laws of belief (such as the Rambam), was clearly to protect weaker minds from the assaults of misleading philosophies and irresistible temptations. Doubt is always a danger, and was to be rejected forcefully, without risking any untoward slippage. But, granting our above arguments, the epistemological and logical background of this sort of codification is incorrect and unstable. Furthermore, incidentally, its psychological effect is not always ideal. Openness is right, and healthy too.

However, upon further reflection, a more even-handed conclusion is possible. Introspection shows that in the course of religious living, there are often moments of doubt, when everything conspires to make us doubt God's existence, or His mercy, or His justice, or whatever. Things may be going so badly, that one wonders whether He is at all interested in helping us or whether He knows how to judge correctly or whether He is at all there to do so; or one may view Him as one's tormentor and wish one could appeal to Someone else, some higher or more sympathetic power, for help; and so forth. In such circumstances, it is indeed very useful to have a *law* of belief (in God, in God's Oneness, etc.) to hold on to, so that, through fear, even though not *at the time* through pondered conviction, one keeps to the right path.

One may even tell oneself: no matter how bad things look, I will always trust in my own essential goodness or sanity, or in my wife's loyalty, or whatever. Such resolutions have pragmatic value and make it possible for us to transcend the vagaries of daily experience. Epistemologically, they rely on the fact that there is a hierarchy of truths; some truths are more certain than others. Thus, for instance, in logic, the laws of identity, of non-contradiction and of the excluded-middle, and certain other principles, are given priority over all others, so that if ever things look bad, it is not these laws which are put in doubt but all other interpretations of the disturbing phenomena at hand.

In this light, an ethical law of belief is quite conceivable, like a protective message from the past to the future. God may know that I am about to enter a turbulent experience (and everyone does, sooner or later), and forewarns me: "today, you know that I exist and that I am One, etc. - but tomorrow, you will have the momentary illusion that these truths are unjustified; so, I advise you to hold fast onto them come what may". Such resolutions are not necessarily contrary to logic, and in no way demean the intelligence of humankind. In this way, mitzvot relating to belief are made reasonable and conceivable; they do not tell us to believe (or not believe) in the way of blind fanaticism, but rather protect our knowledge from unfortunate erosions.

For these reasons, by the way, the Mitzvot relating to belief which we have listed here are regarded as 'constant'; that is, applic*able* non-stop. Surely, it is not humanly possible to literally *always* remember the Sabbath or Amalek's enmity, or *never* forget Amalek's enmity. The human mind can only focus on so much at a time, and must therefore allow some objects of consciousness to at least recede into the background, if not disappear entirely, for a while every so often; we must also sleep. Therefore, such temporal expressions must refer, strictly-speaking, to an occasional (though as frequent as possible) or conditional (in all the appropriate circumstances) performance.

In the case of our laws of belief, they are comparable to a defensive weapon one carries on one's person at all times, not knowing when the enemy will strike, ready for all eventualities. The weapon is not constantly in use, but it is invariably ready for action. Of course, our resolve to fall back on these fixed beliefs in times of doubt, colors our whole

existence, in the long run determining all our choices; for the belief in God and all its implications have undoubtedly broad and deep influences on the human psyche and destiny.

15. EPILOGUE.

1. Motives of the Present Research.

Judaic Logic: A Formal Analysis of Biblical, Talmudic and Rabbinic Logic is not the work of a Talmudist, but that of a logician. The author, who made significant contributions to various fields of (secular) logic in his previous work, felt qualified in that capacity to analyze and assess, in novel ways, the logical processes found in Judaism. A logician can claim to understand Talmudic logic, without claiming more than minimal knowledge of the Talmud. A Talmudist certainly has much greater knowledge of the Talmud's content, and by virtue of regular practice may well be a far superior practitioner of Talmudic logic. But a logician has the advantages of theoretical knowledge and the habit of apprehending the formal aspects of thought; he may not take into consideration all the forms of reasoning used in the Talmud, but he can more deeply comprehend those which he does encounter.

In an absolute, normative sense, the term "logic" must refer to something universal. Logical mental processes are forms of thought which take us closest to truth in a given context of raw data. The science of Logic is a record of such forms combined with attempts to explain their distinctive efficacy. The idea that there are "logics" particular to cultures is not a denial of universality, not a claim that different peoples or periods are subject to different epistemologies. A given culture may be defined and measured by the sum total of its experiences and conceptual insights, as well as imaginations and actions; and this collection of factors differs from culture to culture. Logical practice and theory are aspects of culture, and are bound in specific cultures to differ in scope and emphasis. The underlying human apparatus of knowledge remains essentially the same, but it may develop in various directions and to different degrees. Of course, judgments are feasible; relativism is untenable. If different practices or views of logic are found not to be in harmony, an evaluation is necessary: there must be some kind of ignorance or error on one side or the other or both.

The present study was undertaken with three motives in mind:

1. **To elicit from Talmudic logic any information of value to general logic.** Contrary to what might be thought, secular logicians have not exhausted their field. The science of logic is an ongoing enterprise, which, in spite of the great successes of Aristotle, Philo, Bacon, Mill, Russell and Lewis, still has much to achieve. Its mandate is nothing less than a thorough observation and evaluation of the forms of human thought (conscious or unconscious, commonplace or rare), and their assimilation in an all-embracing epistemology. As it happens, at least two forms of argument which were emphasized by R. Ishmael and his colleagues, namely a-fortiori argument and reconciliation of conflicting theses, have received little or no attention from Western logicians so far.

2. **To provide Talmudists with more developed logical tools and techniques**. Although many teachers and students of the Talmud possess very impressive powers of reasoning, they are apparently rarely aware of the abstract aspects of their thinking processes and of the need to formally validate them. They are able to formulate or follow enormously complex arguments, in their heads, orally, without recourse even to pen and paper; but would be unable to capture and explain the underlying patterns which ultimately justify the conclusions. Apart from certain stock classifications, they remain suspended at the level of content, untrained in formalization. Such a pragmatic approach can yield valuable results, but a systematic approach is bound to be more efficient and is more certain to avoid error.
3. **To focus the debate between science and religion on epistemological rather than ontological issues.** The integration of our secular knowledge and spiritual beliefs is a fundamental need of the human mind and culture; the alternative of compartmentalization involves a sort of mental or cultural forcing, and can only be a temporary measure. Conflicts between experience and reason, on the one hand, and faith, on the other, can best be diffused by a dispassionate consideration of the underlying logical issues. Many disagreements can be harmonized, by showing at the least that the sides are simply alternatives in a disjunctive proposition, which though they may inductively be of varying probability are deductively on equal footing, for all practical purposes a matter of personal choice.

To what extent these goals have been fulfilled, readers will judge. In addition to these theoretical purposes, the author had a personal motive, namely the review of his own religious commitment. For this reason, and in order to make clear to readers that the work has gone through a process of evolution, and was not a pronouncement of preconceived dogmas, it was necessary to write the book in such a way as *to allow the various archaeological layers of eventual thought to remain visible*, so far as possible within the limits of consistency. During most of the writing period, the book's title was to include the word *Reflections*, to signify return again and again to a topic, under the influence of new discoveries or insights in other areas. Transparency makes the process as important as the result. The result is, it is hoped, a lesson in independent thought; meaning, not invention, but free research of the facts and possibilities, commitment to reality and acceptance of eventual doubts.

> Jewish tradition asserts that such intellectual explorations may be spiritually dangerous. Going too deeply into questions is likely to increase sources of doubt, and complicate spiritual life (with inner conflicts and lack of social uniformity), if not cause sin and apostasy. To be sure, philosophers have not historically been happy and well-adjusted people, or shining spiritual examples. But one might also wonder how high a spiritual life based on *imaginary certainties*, though easier and less risky, more pleasant and impressive, takes one. Knowledge and knowledge of one's ignorance are tests. Like all other tests, one may fail them - or pass them. It may be that failing them, one is worse off than having not taken them; but passing them, one is better off than having not taken them. In any case, to advocate that life be faced with open eyes, is not to look for trouble. Life, for everyone, is rife with opportunities for religious doubts; surely it is better to learn to take things of that sort in stride, than to rigidly resist until one day perhaps some major experience or insight shatters the whole defensive structure. A spiritual commitment out of pure faith, transcending all empirical and rational forces, and of course emotional forces, would seem more stable in the long run. And that presupposes a certain intellectual openness and flexibility.

2. Conclusions of Our Study.

Now, we have already effectively listed, in the **Abstract** and table of **Contents** at the beginning of this book, and we need not repeat them here, the various topics covered by our inquiry. Our task, here, is to draw some sort of final conclusions.

1. With regard to **aspects of Judaic logic which can enrich Western logic**, we have extracted the following material:

   Of historical interest is evidence in the Torah (and Nakh), as well as in Talmud (and other Rabbinic writings), of use and awareness of various complex forms of reasoning, in some cases well before their assimilation by Western literature or philosophy. Particularly noteworthy are the following:

- There is clear evidence in the Torah of knowledge of the two laws of **adduction**. They are not merely *used* there, but are expressed as *principles* (Deut. 13:2-4, 18:21-22); however, the principles are not formulated in purely formal terms, as general logical methods, but in relation specifically to the evaluation of prophecies and prophets. In any case, this antedates by centuries, if not millennia, Western consciousness (though probably not, use) of adductive procedures. Adduction is commonly practiced, and ably so, in Talmud and other Rabbinic writings, but (as far as this author knows) it does not receive theoretical attention.
- On the other hand, we find in the Talmud another important inductive practice, with a considerable measure of self-awareness (developed more fully in later Rabbinic writings), namely, **reconciliation of conflicting theses** (*kushya, terutz*). This process plays a major role in Talmudic discourse, and is counted as among the 13 principles of hermeneutics. It is found used later in Christian (and supposedly, in Moslem) debates of the Middle Ages, and acknowledged in Western philosophy in the concept of dialectic (thesis, antithesis, synthesis), but has otherwise not received due focus and formal treatment in Western logic. The author of the present work has in his previous work, ***Future Logic***, proposed a thorough formal analysis.
- **A-fortiori** argument is often, and properly, used in the Torah and Nakh (we have indicated some 30 cases); however, though certain words recur in these contexts, the terminology is not uniform or exclusive, and there is no evidence of self-consciousness in this practice. In Talmud we find a very frequent resort to a-fortiori, as well as a *specialized terminology* and the awareness of such argument as a *distinct class*. This practice continues in subsequent Rabbinic writings, which furthermore develops a theoretical understanding of the argument, including *distinction between positive and negative moods*; however, though *near-formal*, this understanding is not entirely formal, being expressed specially in terms of the stringency or leniency of legal/ethical prescriptions, prohibitions and indulgences. We have in this volume proposed a more formal analysis of the argument[302].

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302 That analysis constitutes the only bit of really fundamental research, of value to generic logic, in the present work.

- There is further evidence of logic in the Tanakh, in the sense that the characters within the narrative make "if-then-" statements which suggest underlying reasoning processes, but (so far as this author has noticed, apart from the above mentioned) these processes are not very transparent, and so difficult to identify precisely and classify. Furthermore, contrary to the claims of Jewish tradition, there is no textual evidence that the hermeneutic principles were known, or that Talmudic-style debate was engaged in, in Biblical days. Of course, the Bible is not intended as a manual on logic and need not have reported such matters. But the linguistic evidence in the case of a-fortiori, the only identifiable process for which we have data, tends toward such conclusion, especially when we compare later, Talmudic, terminology to the Biblical, and consider the evidence of development from Mishnah to Gemara.
- We find in the Talmud, and later Rabbinic discourse, highly developed deductive procedures in the field of **ethical logic**: the various kinds of ethical[303] statements, issues of awareness, motive, intention, attitude, transfers of ethical modality from genus to species of action or vice-versa, are clearly considered and understood by Talmudic participants and thereafter. To what extent such factors were assimilated by the legislators of other nations in the same period(s) of history has not been investigated by this author; but judging from the comparatively deontic slant of Jewish culture (later transmitted into the Christian and Moslem cultures), and from the fact that Western logic has only recently began to study the formalities of ethical logic (under the name practical or applied logic), one may assume that the Talmud was breaking new ground.
- Finally, the Talmud is replete with other forms of reasoning, notably opposition, eduction, categorical syllogism, apodosis, *reductio ad absurdum*, hypothetical syllogism, dilemmatic argument, argument by analogy, generalization, particularization, and so forth. These are frequently and skillfully used, and with a considerable degree of consciousness of their workings, but one would hesitate to say that the participants had engaged in any formal studies.

> One may be surprised by the Rabbis' ignorance of formal logic. One would have supposed that the works of Aristotle would have found their way to Judea soon after the conquests of Alexander the Great; or at the latest by Talmudic times, considering the degree to which Hellenic culture (or, more precisely, Hellenistic culture) had by then permeated the so-called civilized world. Indeed, many Rabbis are reputed by the Talmud itself to have delved in Greek knowledge; but while they may have absorbed some of its rationalism and empiricism in a general way, they do not seem to have grasped its logical formalism. Even later Rabbinic writings, such as Maimonides', which are clearly more systematic than the Talmud, seem devoid of any really formal approach to methodology, despite the developments in logical science of the Scholastic period, to which many Jews contributed, at least as translators of Greek works from Arabic (often via Hebrew) to Latin. All this suggests the insulation of Jewish culture from its surroundings, which was indeed willed by the Rabbis, and it demonstrates in particular the relative independence of the developments in Judaic logic.

Of scientific interest to today's logicians are, especially, two of the above mentioned factors of Judaic logic, namely: **dialectic logic** and **a-fortiori logic**. We would suggest that these are, if not original and special (nothing in logic can be truly unheard of, since it is ontologically an aspect of the world we live in and epistemologically an innate capacity of

303 Needless to say, the term ethical is used here with reference to a mode of modality, which covers legal statements as well as others.

the human mind), certainly sooner and more fully used, developed and studied in Jewish culture than in any other. More important still, is the fact that they have not till now been seriously considered by modern logicians. The present author claims to be the first ever, in 1989-90, to develop a formal theory of induction (factorization, factor selection and formula revision), which elucidated the mechanics of reconciliation of conflicting theses; and the first, in 1991-92, to deal with a-fortiori argument in a thorough manner.

Yet dialectic is a fundamental process of all-embracing epistemological significance, being the way the mind responds to the continual contradictions of our world, from the ever-changing impressions at the perceptual level, through concept modulation, to the repeated adjustments of abstract scientific theories. As for a-fortiori, although a comparatively specific part of man's logical arsenal, it is still of considerable epistemological importance, allowing us to maintain consistency in the quantitative (degree) aspect of our concepts. In any case, logicians are still bound to consider such processes, just as the mathematician is bound to consider curved spaces or binomial equations.

On the negative side of the ledger, we may mention the following phenomena, which are of interest to science and history only as examples of how very far from logical thought people, individually and collectively, are sometimes able to go[304].

- We may first note that **Talmudic and later Rabbis were far from all-powerful or omniscient in logic**. This comment would be redundant, were it not for the mythical dimensions they are given by Jewish lore to justify the finality and immutability of Talmudic and subsequent decrees. These people did occasionally - individually, if not always collectively[305] - make unconscious errors of logic (even if they were very often skilled practitioners); and furthermore, their theoretical baggage in this field was incomplete and faulty (though admittedly not negligible). In some cases, the practical errors and theoretical gaps seem conscious; and we may suspect them to have been made with a manipulative intent, to confuse people and thereby impose predetermined legal outcomes on them.
- Most shocking is **the considerable number of fallacious thought processes engaged in and defended by Talmudic and later Rabbis**. This refers to the paralogisms involved in many Rabbinic hermeneutic principles and practices, and also to the intimidation used to support them. The major cause of such faulty thinking was the Rabbis' ignorance of the *formal* method of logical reflection (which they were apparently too proud to learn from the Greeks). Consequently, processes which should have been recognized as inductive or even unreasonable were ascribed deductive value. Lacking objective and universally valid tools of evaluation[306], the Rabbis opted instead for disloyal methods: cutting corners; obscuring uncertainties and antinomies by using overly tortuous and long-winded arguments, without

304 In the way of a "rogues' gallery" in a museum of logic! Such exhibits are still interesting to logicians, for the reflections they stimulate.

305 Individually is bad enough. Though collective review provides a corrective mechanism, the fact of individual error demonstrates the fallibility of the participants, and therefore the possibility that the mechanism is not invariably fool-proof.

306 That the Rabbis sensed their thought forms to be shaky, was implicit in their interdicting use of these forms without authoritative license, as well as in their need to appeal to a *Deus ex machina* for support.

terminal organization[307]; claiming Divine sanction for their arcane modes of thought; and parrying criticism by means of irrelevant accusations and threats.

2. With regard to **aspects of Western logic which can enrich Judaic logic**, the following may be said:

To begin with, it must be understood that **there is nothing *foreign*, i.e. non-Jewish or anti-Jewish, in the science of logic**. It may have historically been developed by non-Jews, with Aristotle, a Greek, discovering formalization (that is, putting symbols in place of specific terms, in order to verify the universality of a thought process, independently of its content) and the laws of thought (identity, non-contradiction, exclusion of the middle), and studying the categorical oppositions, eductions and syllogisms; and various other individuals, some of them Christians or of other persuasions, following suit and investigating the same in more detail or other forms of reasoning, such as hypothetical and disjunctive argument, inductive logic, and so forth. But the ethnic or religious identity of these people had no pertinence (any more than it would in medicine or engineering).

The purpose of logic research is not and was never to prove or disprove something about God or any religion. The goal was and is, simply and innocently: *to understand and validate human cognition*, to know when one is right and when one is wrong, to know what constitutes evidence and what may be inferred from it, to avoid errors and to avoid being misled, to exercise intelligence and defend oneself against foolishness.

Most Rabbis have had a phobia towards "Philosophy". But this is a straw man. Philosophy in its purest sense, limited to epistemology and ontology (and excluding mere metaphysical speculations, personal reflections on life, psychology, ethics, politics, and all such relatively literary productions), is a neutral investigation, whose results are unpredictable. Philosophy is not *a particular doctrine*, like Judaism - it is, at its best, an honest, unprejudiced search for truth, or (if truth is not to be found) at least an admission of ignorance. It is open to knowledge wherever it is to be found; and those who think otherwise have not understood it. The science of Logic, in particular, is a key discipline in this search for truth; neither quite epistemology nor ontology, though a part of both, it stands at the interface between them, as their motor and regulating mechanism, at once partly their source and by feedback partly their outcome too.

> To say that something is true, or untrue, and to keep piously insisting on it, does not make it so; there has to be a convincing argument. Likewise, *ad hominem* praise or accusation, whether correct or incorrect, and hopes or fears as to the moral or social consequences of information, have no ultimate bearing on truth-value. Despite all efforts by the Rabbinic establishment to interdict or ignore enlightened research and reflection, they have historically not succeeded in preventing the statistically manifest diminution in belief and observance among ordinary Jews[308]. This conclusively proves the futility of intellectual arrogance and dictatorship, and of an ostrich policy. There was a

307 Finally ordering and clarifying, if not simplifying, their arguments, *so as to verify them*.

308 Looking at the past couple of hundred years. As for the *Baal Teshuvah* (Returnees) movement of my generation and after, it has been highly overrated and seems, to my prejudiced eyes, anyway to have peaked and be pettering out. I was part of it myself, and can report my disappointment. Expectations of higher consciousness and of moral and social improvement were not fulfilled. Much more could be said on this, but it is irrelevant to our discussion.

> failure on the part of our clerics to meet the challenge of rational and empirical truth head-on, and work intelligently, and with respect for their opponents and their flock, on the effective solution of real problems. We are all in the same boat; the problems considered by secular logic, philosophy and science, are not *goy* problems but *human* problems, for all of us to take into consideration. They cannot be by-passed or waved-off, they remain applicable to all human cognition, to all claims to knowledge. Left without convincing validation, any claim to knowledge is effectively invalidated.

Now, what we have tried to convey in the present work, to students and teachers of Talmud and Jewish law willing to think things through honestly and intelligently, is **a firm grounding in logic**. This means, first of all, a special *way of looking* at intellectual issues, which may be characterized as eidetic, being an effort to consider above all the formal aspects of any argument, and try to objectively clarify the processes involved in it by means of algorithms, so as to determine its continuity or gaps, and be able to estimate its abstract validity. Content is secondary, and may be affected by or affect the passions, clouding judgment; what counts primarily is form. More important than piety is the psychological attitude of openness and fair-mindedness, a willingness to accept whatever reality has to offer; there has to also be a will to pursue truth further and deeper, and not be satisfied with convenient superficialities and complacent stereotypes, a willingness to repeatedly test and revise one's own current ideas.

Secondly, there is a need to learn the specifics of existing theoretical logic, and why not when necessary try to make further developments in the field, so as to be prepared and have the technical means for the job at hand. Logic theory and practice are to concepts in general, what algebra and arithmetic, respectively, are to numerical concepts. In the domain of religion, as in any other, one cannot expect, without adequate training, to avoid the pitfalls and limits of ordinary thinking; one must adopt a more conscious and advanced methodology. Furthermore, the pursuit of coherence and profundity calls for periodic bouts of systematization; the various elements of our apparent knowledge must be ordered, and their interrelationships clarified and judiciously checked. Dubious forms of reasoning must be dispassionately identified as such, and ultimately rejected if they cannot be improved upon, without yielding to intimidation. These are obvious instructions, but always worth reminding.

Lastly, we may address a message to Talmudists, exegetes, and Jewish lawmakers. The spiritual yearnings of human beings will surely never cease, but they may well be dulled by the arrested development of religion. Torah scholars, rather than trying to inhibit secular education, ought to rather encourage all knowledge and respond creatively to the virtue of enlightenment and hunger for more knowledge that it generates. It is evident that the thinkers who produced the Talmud greatly enjoyed themselves; they were, in their time, at the cutting edge of intellectual development. Men like the Rif, the Rambam, particularly through his *Mishneh Torah*, or Joseph Caro, through his *Shulchan Arukh*, further enriched and perpetuated Judaism, because they had the courage to rethink the Talmud, summarizing and ordering its results, using methods which in their respective epochs were more 'modern'. If the approaches used in Judaism in the past are not again updated - today, tomorrow - then the enterprise is at a dead end.

> Life is movement, life is participation. Spiritual guides cannot just re-enact the intellectual adventures of their predecessors, they must rekindle the flame and produce light visible to their

> contemporaries. The Jewish market is not buying, simply because the goods offered are rather dusty and shabby. The impasse Judaism finds itself in today is due in large measure to an intellectual bankruptcy, a tendency to aloofness and sclerosis. Mimicry of the style and ideas of past achievers is not enough, there has to be a contribution relevant to present levels of education. Many would-be defenders of the Faith seem merely to be trying partake in the glory of famous persons (very "humbly", of course) and project an image of piety (for the social dividends). But most people are not fooled by posturing; they demand more challenging and inspiring products, which they do not have to pretend interest for, in a sort of "Emperor's New Clothes" frame of mind. Not all present production falls into such weary categories; the innovative work of R. Adin Steinsaltz, for instance, does not.

The task now, we here suggest, is **to systematize, not the *content* of the Talmud and subsequent Jewish law, but their reasoning *processes***. It is not a matter of organizing and ordering the conclusions of past legislators, nor even of identifying in an abstract manner the categories and principles of Judaic hermeneutics and heuristics; but to stringently clarify and evaluate, step by step, like in a computer program, *every single* argument put forward by these legislators, for *each* step indicating the kind of process involved[309].

A major finding of the present work is the extent to which Talmudic/Rabbinic logic is inductive, rather than deductive. This means that conclusions drawn by the legislators are much more dependent on knowledge-context and technical skill than traditionally assumed, and therefore more subject to review and likely to need revision[310]. On the deductive side, in any case, a great many of the arguments are enthymemes (they are abridged, excluding "obvious" factors); wherever there are discontinuities, a clear distinction must be made between given premises or conclusions and propositions assumed to fill the gaps. Wherever, eventually, mistakes or weaknesses are spotted, they must be freely admitted without regard for the prestige of the source, without presuming against all evidence that some unknown data or insight motivated the problematic statement, and undaunted by covert or overt threats, by clerics, of Divine retribution (confident that God *approves* of truthfulness).

Another major finding of this study is the extent to which Talmudic/Rabbinic logic is fallacious. We may no longer, today, tolerate fuzzy logic, with regard to the foundations of religion's methodology or with regard to its routine arguments. These issues must be considered with an impartial and steady eye.

First, with regard to the **grounding** of Talmudic/Rabbinic method**.** It is reasonable that whatever methods of interpretation are ultimately adopted to elicit ordinary laws from the Torah, if those methods are themselves claimed to be based on Torah text, the reading of them therein must be literal and obvious to everyone. That is, **while non-methodological laws can conceivably be "derived" from the proof-text in weird and wonderful ways, *methodological laws* cannot (without circularity) be similarly justified, but *must be clearly explicit in the text,* if not obvious by natural means**. This important logical precondition applies, to start with, to the reading of 'constitutional' laws, like the law

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309 Saying, for examples, "this is a conversion, of **A** to **I**", "this is a syllogism, 2/**EAE**", "this is a simple constructive dilemma ", "this is an a-fortiori argument, and here is its major premise, and that is its middle term, etc." , "this is a generalization, from **O** to **E**".

310 This is not a gratuitous statement; I have often enough (mostly on Sabbaths, however, when note-taking was impossible!) come across arguments in Talmud study sessions which I could not consider valid.

giving legislative authority to the judges, the law of majority ruling, the law about neither expanding nor diminishing the law, and so forth. With regard to the hermeneutic principles, other than a-fortiori and adduction (which are both natural, as well as Biblical), there is no evidence for them in the written Torah. The claim that they are part of the oral Torah is not an argument: that there is an oral tradition seems sociologically likely and is hinted at in the text; but whether such a tradition originally contained these specific, or any, hermeneutic principles is impossible to establish.

Second, with regard to Talmudic/Rabbinic **rhetoric**. (a) When the illogic of certain forms of thought used traditionally is demonstrated, we are told that the hermeneutic principles are not really a logic, but a Divinely decreed way to decode the Torah. On the other hand, if we look at actual Talmudic/Rabbinic discourse, it is clearly designed to appear as a process of rational argument yielding a convincing result. They cannot have it both ways. (b) The illogic of traditional argument is masked in various ways. Terms and doctrines are loosely defined, and used in incompatible ways in different contexts *as convenient* (i.e. not by virtue of formally demonstrable distinctions)[311]. Corners are cut, ostensibly for the sake of brevity, but actually to get away with fake reasoning. Arguments are long-winded, with many side-digressions, with the effective premises and the conclusion kept as far apart as possible, so that the lack of connection or even contradiction between them is well hidden. There is no honest effort at transparency. (c) When one has Reason and Truth on one's side, there is no felt need to 'get heavy' and use intimidation. Yet religious authorities freely accuse people who say or do scientific things of being *apikorsim*[312] and threaten them with loss of heaven for raising doubts concerning religion. One might suspect that such accusers are unsure of their own arguments, since they resort to such techniques.

There has to be a continual and sincere effort on our part to review and maintain both ***internal* consistency**, with Judaic texts themselves (with the data properly hierarchized), and ***external* consistency**, with secular knowledge (again, taking into account the latter's degrees of probability). **Logic is something *universal*, which cannot be ignored or overridden.** If there is an inconsistency in knowledge, at any level and between any two parts thereof, it must be taken seriously and resolved if possible, without prejudice one way or the other. Any revision called on by strict logic, in a given context, must be accepted. This is to guarantee *truth*; something is true, not merely because it is said to be, but by virtue of the quantity and quality of effort undertaken in honestly establishing it as such. Where an act of faith is required, so well and good; but it must be recognized as such, and not falsely claimed to be an act of empirical or rational cognition.

Judaism can only gain, in scope and strength, from such a programme, both in general credibility and in specific content. For such thorough analysis would very probably bring to light problems, the attempts at solution of which would generate new and important insights, and might even make possible considerable revisions of the law by the established

311 For instance: a general statement might be made in a given context, because it 'proves' a point; while, elsewhere, that very same general statement might be denied, without trying to render the two sides consistent.

312 Sing. *apikorsus*. The expression presumably derives from 'Epicurean', and is taken to imply that the person so afflicted yearns only for debauchery and such. But this accusation more deeply suggests the person concerned to lack objectivity, truth-orientation, honesty, etc. (unlike the accuser, supposedly). That is an inconsistency in it!

authorities themselves[313]. The work required can only be carried out by highly-educated and superior intellects, people expert equally in Talmud and Rabbinic law, logic and philosophy, and the special sciences. These would be the true Rambams and Joseph Caros of the day, those who would ultimately inspire the Jewish people anew.

3. With regard, finally, to our third stated goal, that of promoting more harmony between secular science and philosophy, on the one hand, and religious texts and beliefs, on the other, little more need be added to the above. The general methodological guidelines, for both sides, are obvious enough. There is need for openness and realism, humility and courage; looking impartially at the different sides of an issue; attention to nuances and alternatives, and avoidance of over-simplification; not drawing more conclusions than logically legitimate from the data available; insistence on evidence and cogency, and consideration of logical possibilities and probabilities; testing and re-testing all ideas - etc., etc., etc. These are primarily *attitudinal* prerequisites of valid knowledge, reflecting a certain readiness and effort of the will, as well as a wisdom regarding the powers and limitations of the human cognitive apparatus. Such attitudes, while not directly impinging on results, make any results obtained more credible.

On the religious side, we have before us, firstly, **the Torah**, a text we believe, out of pure faith and respect for our forefathers, to have been Divinely revealed. This text is often ambiguous and often equivocal. A distinction must therefore at the outset be made between its strictly literal meaning, to the extent that such is clearly discernible, and all interpretations read into the text over time, by people, however authoritative, whether in response to noticeable vagueness or incogency, or motivated by unrelated beliefs or agendas. With regard to the relative credibility of exegetes, there is a need to realize that the concept of authority itself is not unassailable: taken as absolute, it involves circularities in argument; status can only healthily be attributed by virtue of and to the extent that, and maintained so long as, the doctrines of an advocate are *credible* - the status is an effect, and cannot be viewed as a cause, of doctrinal credibility. The possible interruptions, and subtractions and additions, of an oral tradition must be taken into account, when considering its end-results; critical review based on solid information and tightly reasoned argument need not imply total rejection: unrelated matters remain in force.

The oral tradition is claimed by its defenders to be perfect; where it seems imperfect, a failure of vision or knowledge is imputed to the beholder, and eventually a moral accusation and social ostracism. But *a-priori* definition of the content of "orthodoxy", as against "heterodoxy", implies a prejudice without appeal: it cuts short all possible reflection and can only win the allegiance of people unconcerned with objective standards of truth. An independent thinker would suggest that, even granting the founding document (the Torah) to be of Divine origin, albeit the difficulties it presents, the exegesis of that document remains liable to human error and therefore subject to review. Errors of fact and errors of logic have to be expunged, as in any area of human knowledge: men made them and men can unmake them.

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313 Hopefully, and more likely than not, such revisions would tend towards leniency rather than severity, since many of the severities which have accumulated over time stemmed, it is easy to suspect, from cultural or subcultural superstition and fanaticism, rather than truly legal considerations.

Furthermore, not only are traditional statements relating to nature or history open to review, but legal statements would seem to be also, insofar as they are based on material assumptions and reasoning processes which may later be found wanting (i.e. contrary to empirical findings or inconsistent). So long as they can withstand scrutiny, so well and good; but once definite error is found, they can no longer sincerely be upheld. Errors made in explicit statements about nature are easiest to admit, though the more extremist authorities even today would be reluctant to go even that far. Maimonides, who as well as a great legal expert was a true philosopher, expressed himself clearly in this matter:

> *Do not expect that everything which (our sages) have mentioned regarding astronomy should agree with the actual facts; for the theoretical sciences were deficient in those days, and they did not speak of them on the basis of a tradition received from the prophets, but rather because they were scientists by the standards of their times, or because they had heard about these matters from such scientists.*[314]

But, though assumptions concerning nature or history do not always affect legal dispositions, they often do. It would seem justified, in such cases, to demand review of the legal conclusions, if the non-legal premises prove wrong. However, strictly speaking, it would be a non-sequitur, since as logic teaches refutation of a premise does not necessarily imply rejection of its conclusion. *Unless* - and that proviso would seem to apply in enough cases - the conclusion could not have conceivably been based on an alternative, acceptable, premise; that is, unless the conclusion was manifestly *exclusively* implied by the original premise (so that denial of the premise implies denial of the conclusion).

Examples of such errors are common enough in the Talmud. The following are obvious samples, which would not seem radically threatening:

- "The time from one *molad* (new moon) to the next is *halakhah l'Mosheh mi-Sinai* - 'law revealed to Moses on Sinai' - and is given as 29 days, 12 hours, 44 minutes, and 3-1/3 seconds. Those who understand the elements of astronomy know that the time interval between one occlusion and the next varies by as much as 13 minutes, owing to the varying speed of the sun and the moon along their elliptical paths. To find the accurate average by observation requires not only sustained observation but also accurate tools for timing."
- "There is a small discrepancy between the true length of the solar year and that used as the basis of the calendar calculation (namely, 4 min. 21 sec.). This discrepancy, as small as it is, has added up in the course of 1500 years to approximately 4-1/2 days. This causes some difficulties with regard to the compliance of our calculated calendar with other requirements of the *halakhah*."
- "According to the practice of *halakhah*, the circumference of a circle is to be taken as three times its diameter", instead of π (=3.141...).
- "Another example is the classical problem of the length of the diagonal of a square", which is taken as "1-2/5 times the side of the square", instead of $\sqrt{2}$ (=1.414...). "This specifies the practical procedure for determining this length if required by the *halakhah*."

These examples are given by Hugo Mandelbaum in *Torah, Facts and Conclusions*, who there gives relevant Talmud references.[315] He argues that these were never meant to be anything more than

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314 *Moreh*, 3:14. Quoted by Azriel Rosenfeld in *Torah in the Space Age*, Proceedings of the Associations of Orthodox Jewish Scientists, Volume 2.

315 Proceedings of the Associations of Orthodox Jewish Scientists, Volume 1.

> approximations for practical purposes, and therefore that the discovery of inaccuracy does not affect the law. But one might well wonder, if the Sages had known them, why they would have ignored them, not even acknowledging the correct figures. And if they did not know them, why continue to rely on them in the issues concerned. Admittedly, these examples are relatively innocuous (though one might imagine situations where they have, say, financial implications): but there are matters of the sort which affect people's lives more radically, e.g. in the field of medicine.

A purely empiricist/rationalistic approach to such matters does not, by definition, take into account the factor of **faith**. The basic issue is ultimately always the reliability of oral transmission. Not only the Written Torah, but also the Oral Torah is claimed to be Divinely revealed. Just as an act of faith is possible and required in the former case, so in the latter case; the empirical-rational difficulties are not much different in the two cases. The written document might be a work of fiction, whether authored by Moses or others, and even if not so, it might over time have been tampered with. Similarly, the oral tradition might be an invention, the accretion of centuries of naivety or dishonesty, or again it might not. Such things are difficult to *prove* one way of the other.

One might point to contradictions within the written text or its bloopers concerning nature or history, as proofs of its human origins; or one might attribute other significances to such events. One might point to the fact that the Sages were not always in agreement with regard to the tradition, as proof that there was originally no monolithic tradition. Or, with more nuance, regard situations where they were unanimous as signs of faultless transmission and cases where they differed as so much evidence that confusions occurred somewhere along the line. The reply that the Torah has seventy facets could seem like a lame excuse, or one could be satisfied by the explanation that it was God's will to promote Rabbinic discussion and arbitration. **At every stage, skepticism is possible and faith is required**. What matters to religion is that acceptance remains possible.

> Another difficulty, which applies equally to written and oral revelation, is that faith is a shaky foundation for law, since faith implies uncertainty (the faith is intended to buttress a position) and uncertainty about the law would seem to exempt one from responsibility for breaking it. It is true that secular legislation is subject to similar queries (at least when we try to base it on a concept of natural justice, as against pragmatic collective coercion), but law based non-secular considerations often additionally goes against common sense, or the 'sense of justice' (which, admittedly, is often a cultural rather than innate phenomenon).

Ultimately, **the choice** of faith or skepticism has to be a personal one, not imposed from the outside by social pressures or, worse still, by threats of violence (except, of course, where the same rights, of others, are at stake). Religion requires it, since ethics, which is one of the main purposes of religion, is impossible without freedom of the will. Science requires it, because knowledge, its principal goal, cannot be achieved under conditions of intimidation or coercion. The individual gambles either way: opting for faith and its promised benefits, one may waste one's life on fanciful nonsense; opting for skepticism to enjoy life more, one may lose Divine support and a delightful afterlife. It is a dilemma, and who can claim to know the answer for sure? What is evident is that once one is locked onto one course or the other, it is very difficult (though not impossible) to escape its relentless "logic". And fence-sitting and indecisive swings one way and the other also have their difficulties!

On the side of science, where human fallibility and the inductive basis of knowledge are more freely admitted at all levels, calls to objectivity, tolerance and flexibility would seem redundant. However, in practice there is a considerable antipathy towards religion, since many if not most people do not admit "faith" as a legitimate basis of knowledge. Those who take a more nuanced position, would accept blind trust as a temporary way-station or working hypothesis, in cases where experience and reason have so far not managed to establish fact or theory of high probability, or in metaphysical issues where science is constitutionally unable to make a judgment satisfactory to its own standards, so that arbitrary choice (to the extent that it is necessary for practical purposes) is inevitable anyway. But in cases where inductive logic leans heavily in a direction contrary to the dictates of faith (alleged to be revealed or traditional), they would refuse them. All the more so, in cases where the issue under consideration seems definitely resolved by empirical observation or logical analysis in a manner clearly contrary to the faith's predictions.

It may in this context be pointed out, to begin with, that science and religion are not in conflict in all matters, just some. There are a number of items in apparent conflict (for example, Gen. 1:10 and 1:14-18 suggest that Earth was created before Sun and Moon); there are many items in apparent agreement (for examples, Gen. 1:11-12 suggests that vegetable life came first; Gen. 1:20, that the first animal life was aquatic); and there are large areas where neither side seemingly impinges upon the other, for one reason or another (as suggested in the previous paragraph). Where there are conflicts, they are not always radical; there are often areas of doubt on one side or the other or both, which make a standoff possible and an eventual compromise conceivable. All this means that general conclusions one way or the other are unjustified, and issues have to be dealt with item by item, with full knowledge of the details and conditions set on both sides.

Also, "science," the secular pursuit of knowledge, is a broad concept, including not only the study of the natural world (the various physical and biological sciences, mathematics), but also the study of humans (history, psychology, sociology, politics and economics, etc., all of which relate to the will), and of course philosophy (epistemology and ontology, logic, which are the sciences of science). The concerns of these disciplines intersect with that of religion in only some areas, as already stated. But furthermore, their levels of certainty are very varied. While the results of the natural sciences on the whole seem most certain, there are significant variations from one specific field or topic to the other. The human sciences, though often well documented and tightly argued, are just as often almost conventional in their wisdoms, products of widely accepted imagination. As for philosophy, there are many conflicting schools of thought; and relatively few areas of agreement, let alone solid grounds. These factors have to be taken into consideration when making judgments.

Secondly, we may linger on the methodological, rather than material, aspects of the two domains, and take note of the similarities as well as of differences in their approaches. Similarities include a wide range of inductive and deductive techniques (which, to be sure, may be occasionally misused). As for differences, some are technical, some relatively ideological or attitudinal. Certain more 'literary' than logical techniques used by religious exegetes would seem dubious to scientists; some aspects of some of the hermeneutic principles used by Rabbis are indubitably sophistic. The reliance on faith, in cases of scientific doubt and more so in cases where science has reached conclusions contrary to religion, and the willingness to submit to authority, may be considered radical divergences.

Suspending one's own judgment, under the guise of 'humility' or 'piety', is unacceptable to science: it is ultimately arrogance. Karl Popper has rightly stressed the distinction between science and religion in the possibility of "falsifiability": science, ideally, remains flexible, open to real change in the face of new observation or insight, whereas religion, at least in its more fundamentalist forms, refuses to budge from certain positions, whatever the evidence or criticism leveled against it. To be sure, the defenses of religious apologists often seem contrived, at best appeals to very distant and improbable possibilities, designed only to maintain their *idées fixes*.

Nevertheless, science is bound to remain tolerant, not merely because religion (at its best) is one expression of the profundities of the human spirit and the reduction of knowledge to a narrower perspective would be a loss to all of us, but precisely because the virtue of science, in its own terms, is its open-mindedness. We sometimes see in the media scientific discoveries and ideas presented as final fact; but actual scientists, who are acquainted with the wider philosophical issues surrounding the scientific enterprise, are not so definite and exclusive. At the core of science are perceptual *phenomena* (such as a flash of light in an electron microscope or a sound emitted by a meter); from these, under certain conceptual assumptions and by means of generalizations, natural "facts" and "laws" of considerable reliability are constructed; and beyond those, through imagination and hypothesis, larger "theories" are postulated and continually checked and adjusted. **At all transitions, we depend on our logical intuitions (or 'common sense', which relies on conceptual *phenomena*) to guide us to appropriate results.** This always leaves a "window of opportunity", however remote, which religion can appeal to, and science, to remain science (that is, true to itself), must nobly concede.

In conclusion, it is hoped that, while this work has certainly not finally resolved all the issues, it has enriched and advanced their discussion somewhat.

Written in Geneva, Switzerland,
from November 1991 to July 1995.
With gratitude to the Almighty.

16. APPENDICES.

1. Further Notes on A-Fortiori Argument.

1. Subjectal and predicatal (or antecedental and consequental) a-fortiori are sometimes found **in tandem**, forming an enthymemic sorites, so that the conclusion of one implicitly serves as minor premise in the other. For instances:

A is more R than B, and B is R enough to be C,
and more R is required to be C than to be D;
so, A is R enough to be D.

(Here, the tacit, subjectal result 'A is R enough to be C' of the first two premises serves, together with the third premise, to obtain the final, predicatal result.)

D is more R than C,
and C is R enough to be A, and more R is required to be A than to be B;
so, D is R enough to be B.

(Here, the tacit, predicatal result 'C is R enough to be B' of the last two premises serves, together with the first premise, to obtain the final, subjectal result.)

2. We often encounter the following **variant forms of suffective propositions**; sufficiency, X is R "enough" to be Y, may mean (and is implied by each of):

Exact sufficiency: X is R "*just* enough" to be Y, or
Generous sufficiency: X is R "*more than* enough" to be Y.

Thus, "enough" is commonly taken to mean "either just enough or more than enough", according to the *spread* between the two starting points of Ry and Rx. The "more than enough" relation may in turn be variously (and more or less precisely) quantified: a little more, much more, etc. But note well that these subsets of the form are just two of the many ways, in a broader perspective, that Rx may be included in Ry.

Similarly, insufficiency is often expressed in the form:

X is R "*less than* enough" to be Y.

This may be further quantified: a lot less, not-much less, etc. As with the expressions "just enough" and "more than enough" used to qualify sufficiency, this expression "less than enough" occurs in specific contexts, namely where we are dealing with a single, continuous range of R (starting at Ry and growing beyond it). But where we have discontinuities in our range, or in other words, several intervals, the language becomes inadequate. However, we should also note two other variants, which attempt to verbalize such discontinuities to some extent (implying, respectively, an upper limit and a lower limit):

Insufficiency through excess: X is "too much" R to be Y, or

Insufficiency through deficiency: X is "too little" R to be Y.

Both excess and deficiency must be taken to imply insufficiency, though for different reasons. Thus, the relation "not-enough" in our frozen sense must not be limited to "too-little" (as often in everyday use), but must range over "too-much" as well. Put differently, insufficiency (in this broad sense) means either too little or too much. But to repeat, such expressions, though useful enough in certain commonly encountered contexts, cannot verbalize all situations. A full analysis of these issues is best carried out through mathematical logic, using symbolic techniques. I will not even attempt it - it is not my forte. In any case, these are details which do not affect the truth of the more generic statements we here make concerning a-fortiori language and logic.

Lastly, note that valid moods of a-fortiori can be developed, using such variant forms of suffective proposition in various combinations. To develop them, we need only take the already validated generic moods as our starting points, and consider the effect of variations. The conditions under which these subsets of a-fortiori are valid are the same as those already established for the main moods from which they derive. Here are a couple of interesting illustrations of the kind of argument meant:

P is *more* R than Q; therefore:

if Q is R *just* enough to be S, then P is R *more than* enough to be S.

Also note, with the same major premise, 'if P is R *just* enough to be S, then Q is R *less than* (i.e. neither *more than* nor *just*) enough to be S'.

More R is required to be P than to be Q; therefore:

If S is R *just* enough to be P, then S is R *more than* enough to be Q.

Also note, with the same major premise, 'if S is R *just* enough to be Q, then S is R *less than* (i.e. neither *more than* nor *just*) enough to be P'.

The reader is invited to work out all other possibilities and the validations.

3. I would like to here make some comments concerning **the representation of natural phenomena in mathematical formulae**, for readers unacquainted with the topic which was raised in the context of our discussion of the *dayo* principle.

Any two or more phenomena, be they physical or whatever, whose magnitudes evidently vary together in some way, however complex, can in principle (provided we are able to measure them precisely) be assimilated into an algebraic equation. Such equations, in turn, have a geometrical equivalent, in a Cartesian space where each of the phenomena is represented by a dimension; their quantitative relationship is then expressed by a straight line or a curve of whatever shape, or some other figure.

A simple example is the ideal gas equation, "pv/t=k", where p, v, t are variables, p=pressure in the gas, v=volume of the gas, t=temperature of the gas, and k=a constant. The equation is called ideal, because real gases do not quite behave in this way; but it is a good approximation in ordinary circumstances. This equation yields a linear relation, in a three-dimensional Cartesian representation. The relationship could just as well have been exponential or sinusoidal or whatever; but this is what experimenters found it to be, by measuring various states of gases and extrapolating the results.

Now, what does this mean in more colloquial terms? An equation like pv/t=k is *a summary of innumerable conditional propositions*, concerning all possible values of the variables. For any given value of p, say, we can predict by a simple calculation all the correspondences between the values of v and those of t:

if the gas has pressure p1, then:

- if the gas has volume v1, then it has temperature t1 (=p1.v1/k), and vice versa;
- if the gas has volume v2, then it has temperature t2 (=p1.v2/k), and vice versa;
- ...etc.

if the gas has pressure p2, then:

- if the gas has volume v1, then it has temperature t5 (=p2.v1/k), and vice versa;
- if the gas has volume v2, then it has temperature t6 (=p2.v2/k), and vice versa;
- ...etc.

...and so on.

Knowing the possible variety and complexity of natural equations, it is easy to see the reasonableness of the *dayo* principle. Two variables may be proportional for part of their course, and then have a radically different relation, if the equation which links them is sufficiently contorted.

4. In my early attempts to understand a-fortiori argument, I attempted a theory which I called the **ABCD Format**. Though this may not be applicable to all cases or go to the essence, it may still have some value, so I will briefly present it here.

'**A**' stands for the *agent*, '**B**' for what is in *between* (the means), '**C**' for the surrounding *conditions*, and '**D**' for the *destination* (goal); note that these terms are used in a broad concept of causality, not necessarily implying movement or change, nor conscious pursuit of ends. In this framework, we can conceive of subjectal a-fortiori as follows:

Major premise (for both the following moods):

> Under conditions C1, agent A, by means B1, causes D, *more likely than* under conditions C2, agent A, by means B2, causes D; therefore:

Positive mood (minor to major):

> If A in C2 (=Q) does B2 (=Rq) causing D (=S), *then* A in C1 (=P) will do B1 (=Rp) causing D (=S).
>
> e.g. The children of Israel (A), while Moses is yet alive (C2), do things (B2) against the Law (D); therefore, they (A), after Moses dies (C1), will probably do things (B1) against the Law (D).

Negative mood (major to minor):

> If A in C1 (=P) does not do B1 (=Rp) and not-cause D (=S), *then* A in C2 (=Q) will not do B2 (=Rq) and not-cause D (=S).
>
> e.g. Joseph's brothers (A), though out of reach of the Egyptian authorities (C1), did not keep found money (B1) and thus avoided dishonesty (D); therefore, they (A), within Egyptian territory (C2), would probably not steal (B2) and thus would avoid dishonesty (D).

Note that all four factors (A, B, C, D) are involved, if only particularly and possibly only implicitly, in each of the three propositions. Note that the relationship between the two clauses of the major premise, which makes possible our drawing a conclusion from the minor premise, is here conceived as one of *probability*, or effectiveness of causation. In this framework, the quantitative aspect of a-fortiori is rather incidental, and the argument involved is essentially an *apodosis*.

Similar constructions can presumably be worked out for predicatal arguments, positive and negative. And likewise for implicationals.

As already said, it is doubtful that this format is of general or profound value, except that it shows the causal subtext of some arguments, and incidentally how the terms of subjectal and predicatal arguments may occasionally be reshuffled from one form to the other.

2. Notions of Time.

In this appendix, I want to put forward some suggestions concerning the Creation narrative, as presented in Genesis I and II and traditional Jewish commentaries thereto, and current scientific theories on the subject. (I wrote most of the text below some years ago; however, some more recent thoughts have been added in the last lines.)

A common preconception is the belief that Science and Religion are somehow in radical conflict. Many scientists wrongly presume that their discoveries exclude the existence of a spiritual dimension to the world, or even the existence of God. As a consequence, religious people, taking these natural scientists at their word, become suspicious towards the whole enterprise of science, its methods and results. But a bit of reflection shows that there is no inherent antipathy between these fields. There is no single discovery of science which in fact, in strict logic, implies an atheistic or anti-spiritual conclusion.

Consider evolution of species or of the universe. All science does is try to *describe* the process. Viewed from above, the process of evolution is simply a larger movement, than say the movement of your baby across the floor; it takes longer and affects more things, but it is still just a movement.

When scientists tell us the 'causes' of some phenomenon, all they are doing is describing some *parts* of it, or describing some *other phenomena* which seem to be repeatedly conjoined with it. Explanation is nothing more than further description, whether in the form of categorical propositions or in the form of some type of conditioning. There is no logical reason why this movement or process, which is a miniature thing in the hand of God, could not have been intended and willed by Him, as a natural outcrop of Creation. Thus, evolutionism and creationism have no inherent conceptual contradiction to each other.

Now, we confront this reconciliation with the literal interpretation of sacred texts - Genesis. How can a process, like evolution of species, or the unfolding of the universe, take millions or billions of years, and yet be claimed to have taken a week, some 5750 years ago?

I don't know the answer, *but I can suggest some* - enough to show that the compatibility of those propositions is quite conceivable, and therefore that there is no logical basis for regarding them as mutually exclusive. Remember that logical possibility is inferable from the absence of logical impossibility, according to the Law of the Excluded Middle (in an expanded, modal form: if not seemingly impossible, then seemingly possible).

Traces of the Past. For a start, the world could have made its appearance yesterday, or a minute ago - the world with all its memories and material traces of past existence and activity - and we would not know the difference. There is no way for us to infer with utter certainty, from the existence *in the present* of memories and material traces, the actual existence of the past *as it appears to us* by virtue of these memories and material traces.

The existence of the Past (or for that matter, the Future), is one of those ongoing hidden assumptions. It is only an assumption, whose counter-assumptions have not been considered or eliminated. (Notwithstanding, it is a pretty powerful appearance, and is worthy of belief. It is a rather radical solution to simply write it off.)

Time with Variable Geometry. Secondly, we can speculate concerning Time, and show that a universe in which a week is also a few billion years is quite conceivable. The number of moments in the Creation week is, say, n; the number of moments in the apparent

eons of world-evolution is also n; each has the *same number* of discrete segments of time, only the segments are *of different sizes*.

Stars come and go, dinosaurs come and go, at accelerated rates, like a speeded up movie. They cannot tell the difference. The processes involved may be descriptively exactly identical, yet have different speeds than they seem to, from our perspective.

The Creator, who alone is beyond Time, is able to compare the segments of time of that bygone era, and the segments of time in the last few thousand years of human history, and can truthfully tell us: one moment of that past time was equal in size to, say, m moments of your time. Perhaps this was what the Psalmist meant, who said (Ps. 90):

For a thousand years in Thy eyes are as a day, as a yesterday that is past.

The notion ***that space and time are continuous*** is a prejudicial assumption. Most people take it for granted, and are not aware of the possibility of an alternative viewpoint: the notion of space or time as discrete (or 'quantized', in modern parlance). An early Greek philosopher, Zeno of Elea, described several paradoxes in the concept of motion. One of these, was his paradox of Achilles and the Tortoise, which went something like this:

> If, upon seeing a tortoise in the distance, the great runner Achilles tried to catch it, he would never succeed. For by the time he got to where the tortoise had been when he first spotted it, the slow-paced tortoise would not be there but a bit further on. Then again, by the time he got to its second station, it would already be at its third. And so on, ad infinitum. He could therefore never overtake it, however fast he ran.

The Newtonian reply to Zeno would be that the infinite subdivision of space by a moving body does not have to take an infinite duration of time, and that the different rates of this subdivision allow for the faster object to converge on and pass the slower one. This is the philosophical background of differential and integral calculus, and it is in agreement with experience and common sense.

However, the paradox could, seemingly equally well, have been resolved by another assumption. ***We could regard space and/or time as composed of discrete segments, extremely but not infinitely minuscule, within which bodies are invariably stationary (though not locked)***.

A moving body would pass from one station to another, by instantly disappearing from the first, and instantly reappearing in the second, without any of its parts having at all traveled within either station. The instantaneous change of place takes no time, only the static existence at each place has an extension in time.

> Think of a stroboscopic light in a disco. Every time it flashes on the dancers are deployed slightly differently. You only assume that they 'moved' through intervening spaces, while the light was off. Suppose, instead, that they ceased to exist during intervening time; there would be no way for you to know it.
>
> If that intervening time span is of zero duration (a point of time, an '**instant**'), they cannot even be strictly said to have ceased to exist. If the time spans during which the light was on (the stationary

'**moments**'), were so small that change within them was invisible to the naked eye or any technological contraption, you would have no empirical basis for claiming that change was in fact occurring.

A valuable analogy is that of cinema. The film consists of a series of 'stills', yet moved rapidly enough through a projector, the image on the screen gives no hint of discontinuity, but appears smoothly ongoing. Even on a static level, Impressionist painters, like Van Gogh, Renoir or Milne, have well demonstrated how a mass of dots may from a distance seem quite integrated.

It is therefore quite conceivable that motion is not as continuous as it appears, but a series of momentary stops, separated by instantaneous 'disappearance here and reappearance there' of the phenomenon. This concept is, incidentally, suggested by the belief that God is constantly recreating, sustaining, the universe.

In that case, the speed (distance over time) of a movement would be defined as the sum of the diameters of the segments of space covered, divided by the sum of the diameters of the segments of time taken. Space and time need not both be discrete; it is also conceivable that only one of them is discrete, and the other continuous. These are further complications, which have to be addressed.

Note that the discreteness viewpoint implies that the Present is a moment, whereas the continuity idea implies it to be only an instant.

Now, my concern here is not the ultimate viability of this alternative hypothesis, which is for Physicists to consider. The point is that, so far as I know, no great effort if any has been put into formulating and testing this alternative, at least not by laypersons.

We accepted the first viable theory that came to mind, the continuum concept, and did not demonstrate the failure of other conceptions to accord with experience and be internally consistent. Even though our theory seems logically coherent and to go on fitting the facts, we still have some obligation to consider and hopefully eliminate any alternatives.

It may turn out that the non-continuous space-time idea solves some previously perplexing problems, like the particle-wave paradox. It treats space and time so differently that it is virtually bound to produce new concepts for us.

It may open new gates for us, like allowing for space or time segments of non-uniform sizes; or like allowing for instant travel from one minuscule of space to another station, a non-contiguous, distant one, without passing through intervening places.

Then again, we may find out that some tightly implied prediction by the maverick postulate is self-contradictory or contrary to experience; but in that case, we have succeeded in more firmly establishing the commonplace assumption.

Sometimes our tacit assumptions are eventually unmasked. An example of this is the Euclidean idea of space-time as straight (so that parallels never meet), which was not so long ago rejected by Einstein in his General Relativity theory, in an effort to solve the paradox of the constancy of the velocity of light, if I remember rightly.[316]

Luckily, recent geometricians (such as Gauss, as I recall) had already prepared the mathematical equipment for the notion that 'parallels' may meet. For instance, like the great circles of an enormous sphere, which seem parallel in a small locality, but ultimately at light-year distances do intersect.

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316 The reader is here referred to books on space-time Physics, such as that of Taylor and Wheeler. It is years since I personally studied the subject, so my memory of details is often sketchy, though I hopefully retained the main essentials.

Once we accept space and time as capable of being curved in reality, even though we have always represented them in our mind's eye and on paper as straight lines, it is quite easy to also imagine space or time as more severely irregular in shape. The lines may be warped and twisted in all sorts of different ways, even with kinks and loops, and there might even be holes in the fabric.

Such irregularities (which may in reality not be as extreme as here suggested) would simply signify that there are certain inherent possibilities and impossibilities in space-time, physical pathways and inhibitions which any passing body is locked into. There would be no way for us to know these infinitesimal restrictions, if the body's transition appeared quite smooth on an accessible level.

(For all we know, bodies may be nothing more than peculiar knots in the fabric of being. Moving, like a ripple of water; tracing a scar across time. I am just speculating.)

Thus, our preconception of space-time as necessarily evenly spaced, in accordance with the Cartesian image given by graph-paper, is not indubitably established. There are alternative conceptions, which seem in principle equally tenable (so far, to me, at least).

***It is therefore quite conceivable, additionally, that space or time consists of discrete segments* of varying size.** One can carry an object like a ruler or clock from one place to another for measurement purposes. But if the ruler expands or contracts to fill an equal number of segments of space of different shapes and sizes, there would be no way for us to compare the dimensions of different segments of space. Likewise, if the clock (which is just a physical process) changed speed from time to time, in accordance with the varying durations of moments, time would still seem constant to an observer.

It may even be that time, instead of being universal, varies with place, so that they are more inextricably tied. In any case, the variations in size may be regular, perhaps ordered from the longest to the shortest or vice versa, or perhaps in cyclical arrangements, or they may be without any pattern whatever.

We would be unable to answer such questions, unless we could somehow see space itself or straddle more than one moment of time. It may be that some technology can be devised. Perhaps we can already experience the diverse sizes of time: perhaps a day which has seemed to pass more quickly than usual literally did so.

Variable time simply implies that all the processes in the universe vary in speed, but in unison or in concert. So long as their *relative* speeds remain the same, their common overall speed may vary wildly without affecting a thing. ***All physical equations remain identical; nothing is detected by measurement***. There does not seem to be any physical way to distinguish this situation of 'variable geometry' from that in a universe of continuous and constant time.

It follows that many postulates are equally compatible with the given data. We may be able to construct distinctive testable predictions, or there may be no way for us to choose between them. The important thing is to keep in mind that even our most cherished beliefs may have alternative viewpoints. The object is not to destabilize, but to remain lucid.

Some may argue that these speculations diverge from the so-called *Principle of the Uniformity of Indistinguishables.* According to this principle, for instance, space and time are exactly the same everywhere and at all times - because, since there is no conceivable way to

physically measure and compare different manifestations of these phenomena, they must be assumed uniform throughout.

But it is clear that this principle has no *formal* value, because we can conceive of logical reasons to justify an opposite belief - namely, that space or time may consist of discrete and somewhat distinct phenomena. If the principle of the uniformity of indistinguishables was regarded as formal, it would have to apply to all abstractions, so that there could only be one abstraction (since abstractions as such are not *sensibly* different). Yet we are all agreed that we may conceive of differences between various abstractions, like say the difference between an electron and a positron (or between the various concepts in *any* sentence we claim as true).

We can often distinguish between 'indistinguishables', at least with reference to their perceivable effects. We may well assume an identity to exist, so long as we have no logical reasons, in a broader context, to do otherwise. The principle in question is only an inductive instrument, and not a deductively compulsory generality.

Indeed, it is only since Newton's time that the infinite divisibility of space and time has been taken for granted. Prior to that, the issue was considered open, as discussions of Zeno's ideas by Aristotle well show. More recently, this principle has been considerably weakened by Albert Einstein's theory of the physical universe as the surface of a four dimensional sphere, instead of a Euclidean extension.

Einstein's intervention opens the door to an fundamental review of the principle of the identity of indistinguishables. For, once we understand that space and time need not fit the perfectly square conception of Euclidean geometry, then anything goes. A breach has been made between the geometry imposed by our limited imagination and the geometry of the wider, external world; that is, more precisely, our imagination has been freed from its Cartesian graph-paper with straight lines mentality, and we can now imagine graph-papers with lines of all sorts of shape.

The Swiss graphical artist M. S. Escher, you may recall, used to draw worlds in which water could go uphill, or stairs could return to the same level while always heading up (or down). If we look on such geometrical perspectives seriously, we might for instance understand the law of gravity, with reference to new definitions as to what constitutes a 'straight' line. We might then, like Escher, view a spiral as a straight line in real-world geometry; in which case there would be no up or down motion to account for.

In other words, Newton's definition of the Law of Inertia might simply be extended to invisible 'forces' like gravity, or electricity and magnetism, or subatomic fields, by redefining what we understand by a 'straight' line. If Newtonian momentum seems acceptable to us without further explanation, why not the mechanism of more curved movements? It is, ultimately, only with reference to volition that the concept of inertia becomes philosophically insufficient.

These are, of course, speculations - which might or might not be useful to Unified Field Theory, or even maybe to biology. But the point being made is that we are, especially since Einstein, more able to visualize alternative geometries - not only a real-world in which space and time are curved at astronomical intervals, but also similarly, a real-world in which there are *localized geometries*, which differ from each other. In this way, the principle of the identity of indistinguishables, becomes a very arbitrary assumption, which does not make an absolute philosophical claim on our loyalty.

There may be still other, better, explanations. I do not know, and it may well be that we are in principle not even able to confirm or discredit such speculations. What matters and is clear, in any event, is that scientific dating does not necessarily stand in logical contradiction to Biblical claims.

So long as conclusive tests are not available, neither position refutes or is refuted by the other. They are logically disconnected from each other, shown to be harmonious.

Thus, biologists and paleontologists, and likewise astronomers, have no logical justification, in any of their actual findings, for regarding the world as exclusively material and natural. Any process they describe would look exactly the same whether it was spontaneous or caused by Providence, so how can they claim an atheistic conclusion?

Conversely, believers can rest assured that scientific findings have no direct bearing on their beliefs. We know so little about time as such, that any statement concerning it is pure guess-work, anyway.

In conclusion, I would like to make here some comments concerning the exegesis of the *Bereshit* text about Creation. There has always been an ambiguity in Genesis 2:2 with regard to the Seventh Day. Was it a historic Sabbath, which took place at the beginning of the Time of the material world, or is it the Final Sabbath, which will happen towards the end of history? Are our weekly Sabbaths a celebration of the first Sabbath or a symbolic anticipation of the last? Commentators have tended to interpret it both ways, unsure of what to make of it.

We could say that the six days of Creation include *all* of natural and human 'history', to its end; whereas the seventh day is a futuristic, *'post*-historical' event. That is, we may view our (past and future) history as interspersed into the textual space **between Genesis 1:31 and 2:1**, and consider **Genesis 2:2** as referring to the 'rest' of God *after* the disappearance of the material world of diversity, when He will (supposedly) return to His solitary Oneness and relax.

Such a viewpoint is confirmed by the tradition that God did not really *finish* His work in the first six days, but continues to mold it (through miracles like those in the liberation from Egypt story or through hidden providential interference as in the story of Esther), working towards its Messianic perfection.

Implied in this viewpoint is that the word 'day' (*yom*, יום) need not be taken literally as a day under the Earth's Sun, which notion is in any case doubtful in view of Einstein's ideas concerning the relativity of time[317]. This is confirmed within the text itself, where the very same word is used to refer equivocally to a longer period: "*in the **day** that the Lord God made earth and heaven*" (Gen. 1:4) - from which it follows that 'day' can equally mean 'six days' or even (why not, therefore) 'an eon'.

In this case, it is not necessary to consider the Biblical text as insisting that the world was Created literally in one of our weeks - it could have taken any amount of time; and furthermore, we need not view the various first six days as being periods of equal length - they

317 To some commentators, the claim of Genesis that the Earth was created a 'day' before the Sun is a problem, in that 'days' (of 24 hours) are counted only once both Earth and Sun are in existence. However, this objection does not seem weighty to me, since we are able to conceive of time and time-intervals more abstractly, starting from any manifestation of changing matter, or indeed of changing mind-stuff.

may each be a long period of time of any length (of whatever length scientific measurement shows them to be), without even needing to call upon a variable geometry concept of time.

> There still remains a problem concerning the order of appearance of material bodies. Thus, the Earth and vegetable matter make their appearance on the third day; the Sun, Moon and Stars appear on the fourth day; the animals on the fifth and sixth days (interestingly, aquatic creatures and birds precede land creatures); and humans on the sixth. Science would not agree to this sequence of things. But medieval Jewish commentators have also previously suggested a revised order, claiming that the Divine *decision* concerning this or that event preceded its *actualization*, so that the physical sequence need not be taken literally as written. We may accept this argument, here.

Ultimately, if religion is to be free of the criticism leveled against it, with much justification, by Karl Popper, that unlike science it refuses to accept the methodological imperative of 'falsifiability', it must submit to change in the light of new data and give up on dogmatism. As far as I can see, the above suggestions are not hard-to-swallow changes.

3. *Gematria*.

Hebrew numerology, known as *gematria*[318], has to be given attention within any work on logic, inasmuch as it is, rightly or wrongly, used by many teachers in Judaism as a method of inference. However, it is rarely a process through which *mitzvot* or *minhagim* are legally established (though the interdiction against eating nuts on a certain festival comes to mind), but is rather a neat way to explain certain laws or traditions ex post facto, producing associations between words or concepts which otherwise would remain far apart.

> I have not to date looked into the history of 'gematrial logic', though I suspect it has gone through a process of development. It is reportedly rooted in the Talmud[319]; but my impression offhand is that it gained prominence in the mystical period following the *Zohar*, especially in the time of Tverya and Sfat mystics like the Ari haKadosh (R. Yitshak Luria, 16th century CE).

Be that as it may, it is relatively easy for us logicians to devise a way to test such an approach to knowledge, as we shall now show. First, it should be noted that the general justification given for gematrial logic by its theoreticians, which gives it some plausibility, is

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318 As an acquaintance of mine has suggested, the word perhaps derives from 'geometry' (Gk.)

319 According to *J.E.* (apparently). Incidentally, *J.E.* mentions other exegetic techniques in a similar vein, such as the splitting of words (*notarikon*) and the transposition or the substitution of letters in words (*al tikra... , ela...* ; i.e. do not read... , but...). Such changes are not, of course, to be made in the Torah text itself, but allow for variant *readings*. With regard to splitting words up or transposing their letters, these proceedings are consistent with gematrial assumptions, insofar as the numerical value is unaffected by them. More broadly, such techniques would seem justified to the extent that they are consistent with established etymological and phonemic principles. However, in some cases, the proposed readings seem artificial and fanciful (to me, at least). We should also mention, while on this topic, variations in vocalization, on which R. Akiba, preceded by R. Yehudah b. Roez, relied (*yesh em lemikra*); but R. Ishmael considered that 'only the consonantal text is authoritative' (*yesh em lemasoret*). Logically, the consonants are empirical data; while the vowels have the status of hypotheses, to be confirmed so far as possible by the entire context.

that the Hebrew language is a Divine creation, antedating the Creation of the rest of the world, since the former was used as the instrument of the latter, as implied by use of the verb *Vayomer* (and He said) in the first verses of the Torah[320]. Thus, according to this view, the Hebrew language underlies the phenomena of this world in a very deep and significant way, and the (correct) names of things may be conceived as not mere arbitrary appendages of them, but as reflecting their very essence somehow. Since the ordered Hebrew alphabet from early on also served as a list of numbers, and that numbers have arithmetical relations, it may naturally be assumed that the letters have parallel relations[321].

While not denying outright the truth of such claims, logical science cannot rest content with justifications formulated so vaguely and broadly. Especially tenuous, in the above arguments, is the connection proposed between letter and number; for even if letter sound and shape reflect essences, it does not so easily follow that their corresponding numerical values are also metaphysical facts. In any case, the issue cannot be resolved purely empirically, at least not in a way open for all to see for themselves. It must be resolved by more rational means. Logic proposes a way: consistency checking. We may arrive at an objective evaluation of gematrial logic by *systematizing its application* and considering whether the results obtained make sense. The first task would be to list the various devices used in gematrial inference, such as those listed below as examples.

a. The letters of the Hebrew alphabet have certain numerical values, a=1, b=2, g=3, etc. The *primary* numerical value of a word is the sum of the numerical values of the letters composing it.
b. The primary value of a word may optionally, on occasion, be *extended* by a unit; they say, “plus one for the word as a whole”.
c. The primary value of a word may optionally, on occasion, be *shortened* by simply adding together the digits of the primary value; e.g. 81=8+1=9.[322]

Clearly, *each such device* produces *a distinct category of numerical value* for all words, so that each word has, correspondingly, *a number of* possible numerical values. Words

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320 See Appendix 5.

321 As a system of numbers, this is much less practical than the decimal. The first 10 letters of the alphabet stand for the numbers 1 to 10, the next eight for 20 to 90, and the last four for 100 to 400; thousands may be indicated by an apostrophe. A number like 5755 is written h"nwt'h, reading from right to left 5000+400+300+50+5. There is no letter standing for zero (*efes*). Arithmetic operations have no sign, but are expressed in words. In my opinion, the lack of zero, the asymmetry of the three numbers 200, 300, 400 (no 500, etc.), and the superfluity of numbers (20 on up), as well as the awkward way available numbers combine to form larger numbers, all point to the antiquity, but also the human origin, of this system.

322 Possibly, a three-digit short value might be shortened to two-digits, and then further still to one digit; also, the extended value might similarly be shortened; each such device, if permitted, gives rise to a different category of numerological value. In any case, I know there are still more devices. For instance: letters whose values are ten times greater may occasionally be considered equivalent; this applies to the sets: 1, 10, 100; 2, 20, 200; 3, 30, 300; 4, 40, 400; 5, 50; 6, 60; 7, 70; 8, 80; 9, 90 (this device, incidentally, might be viewed as a corollary of 'shortening'). Another example: the letters of a word may be spelt out in full, before conversion to numerical values; thus, an a becomes *alef*, and thereby worth 1+30+80=111; a b becomes *bet*, and worth 2+400=402; and so forth (this might be called 'multiplying', and presumably outcomes of this device can in turn be subjected to other devices).

with the same numerical value are numerologically "equal", and the things they refer to can be conceptually associated[323]. An obvious general consequence of such a principle is that all words composed of the same letters, in whatever order, are numerologically identical[324]. But more broadly, we can produce a 'dictionary' of Hebrew words in which *the various numerical values of each word* (the primary, the extended, the shortened, etc.) are specified. Furthermore, a corresponding 'thesaurus' of gematria can be made which groups together *all words having the same numerical value* (according to the method of calculation a, b, c, etc. - or irrespective of these methods if it is permitted to equate their results). These 'books' would be easy to produce in a modern personal computer with a good spreadsheet program, given the database of Hebrew words.

It is impossible to predict the results of such general calculations and classifications. The results obtained may seem so ridiculously mixed-up as to discredit gematrial logic even in the eyes of its advocates; or some interesting and unexpected regularities may be brought to light capable of impressing even skeptics. My *guess* is that, for the most part, the words thus grouped together will be so remotely related to each other, whether as synonyms or antonyms or otherwise, that the value of their being so associated will be at best literary; very rarely, if ever, can we expect the words thus grouped together to present an unequivocal conceptual message. Such may even be the ultimate position of Jewish tradition, since it does not categorically grant gematrial logic a general and binding legal status, but mostly uses it for homiletic purposes.

We might also finally mention, in this context, what may be called the 'new numerology'[325], which has become fashionable in some circles today. Using computers (though the job could conceivably be done manually), every **n**th letter (with various values of **n**) of a Torah text is flagged; e.g. every 10th letter, or every 50th, etc. The letters thus selected are assembled (occasionally, by reversing the order of the letters); and in some cases words or phrases appear, which are not only meaningful in themselves, but which may even bear a relation to the content of the text they occur in or seem to predict later historical events. This is indeed very surprising, and is considered as proving the prophetic origin of the document, since no ordinary human could have intentionally written a document with such properties.

Again, not being involved in such research myself, and not having bothered to study its published results in detail, I cannot pronounce myself concerning it. All I can do is state some of the principles that come to mind, which may or not have been applied:

a. it is not enough to apply the technique to only some parts of the Torah, but it must be done systematically to all of it, and with all possible values of **n** (the number is limited, since the document is of finite size);
b. an explanation has to be adduced for meaningless letter collections, which presumably occasionally occur; and

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323 I am not sure offhand whether or to what extent different categories of value are comparable: can a primary value be equated to an extended or shortened value? or only to another primary value? In any case, these are technical details we need not go into here, our goal being only to define a methodology of verification.

324 Hebrew vowels, composed of dots and dashes, do not (to my knowledge) have numerological values.

325 The given name is, I think, 'Sequences of Equidistant Letters (SEL)'.

c. the technique must be applied to many other documents, too, religious or secular, which serve the function of control samples for the experiment.

Only thus, in perspective, can the results, whatever they are, be evaluated scientifically. In any case, it is to be wondered whether any interpretative dividends from such a technique, devoid of theoretical basis, could be used for Halakhic or even Hagadic purposes. This method is not to my knowledge traditionally counted as a valid hermeneutic technique; so, from the orthodox point of view, it carries no authority. Furthermore, the tool has no predictive value: some letter collections may indeed be meaningful, but they are so only ex post facto (for instance, if researchers had come across the name 'Hitler' 100 years ago, they would not have known what to make of it).

The advocates of this new numerology are said to have demonstrated, using statistical methods, that the probabilities of their results arising by chance are infinitesimal. They adduce this in support of the traditional theses: (a) that the Torah is of Divine origin and (b) that it contains all the secrets of the universe and a prediction of all of history. But these inferences constitute illicit generalizations. With regard to the first thesis, we can only at best conclude that passages of the Torah which actually yield impressive predictions are prophetic; passages apparently not yielding such data remain uncertified. With regard to the second thesis, the discovery of *a few* meaningful character strings does not entail that *all* science and history are contained in the document; one would have to find *all or most known* science and history mentioned in it, to dare make such broad claims.

Another comment worth making is: if the Torah were ever *proved* to be of Divine origin, what would become of faith? Is not uncertainty essential to religion?

4. Three Texts Reviewed.

In this appendix, we review three currently popular texts on Judaic logic. Our object here is not merely to summarize those texts, but to give the reader an idea of the scope of traditional Talmud heuristics, and in passing perhaps bring to light some topics of epistemological significance.

a. Feigenbaum's Understanding the Talmud.

The student of Talmud may know how a Talmudic discussion is generally running, but that is not enough. He must also recognize and appreciate the role played by each line, how the Gemara goes from premises to conclusion, who is talking to whom, whether a statement is merely explaining or modifying previous statements, what question it purports to answer, and so forth. Key phrases, which signal discursive events, and logical structures, which shape the discussion, must be noticed and correctly understood.

The student is advised to avoid pronouns; to know where a quote ends (e.g. through signal words in the *next* sentence) and what part of it is relevant; to know whether the person speaking is a Tana or an Amora; to be aware at all stages of the issues at hand, what is being

said and why, what is sought and what for, etc.; to identify what means are being used to deal with these issues: what kind of statements are involved (as per classification sketched below), what each accomplishes, in relation to which other(s), etc.; to chart the flow of discussions[326]; to understand in what way(s) the Gemara has affected the Mishnah - its interpretation, its applications, its explanation (supposedly, in contrast to the simple reading or *pshat*); and to grasp the overall result (qualification, expansion, rejection, validation, etc.).

A *dispute* occurs when two authorities make conflicting statements about some issue. Conciliation is eventually achieved through providing 'proof' one way of the other, which may mean quoting an authoritative text or sharing a logical insight (*svara*). The interplay of authority of statements has to be carefully considered: for instance, "a mishna, braita or *posuk* (verse from the Torah) can only be taken as proof of a statement when the quote cannot be explained **in any other way**"[327]. Various kinds of statements may be distinguished:

- *information* statements, which relate non-legal data with some function in the discussion; including

  explanatory statements, which clarify something without however laying down or modifying or delimiting the law; as well as
- *legal* statements, which as well as lay down the law describe the circumstances of their applications (the 'scenarios' they concern); including

  qualifying statements, which define the limits of the law, by significantly qualifying the circumstances or the cases where it is applicable.

To this we, with more of a logician's eye than a Talmudist's, might add *assumptions*, temporarily taken up in the course of a discussion, which are subjected to tests and finally adopted or rejected; This *modal* element should not be ignored, as it makes manifest the inductive rather than deductive course of the discussion.

Feigenbaum rightly stresses the dynamics of discovery. The student must not rush to judgment but perceive and follow the intricacies of elimination of theses, the multiple if-then statements and apodotic processes, which result in a complex dialectic. In the Gemara, the course of argument is usually through questions and answers. Different sequences of questions (Q) and answers (A), shape varying 'logical structures', such as:

Q1 is posed,
A1 to Q1 is proposed,
Q2 to A1 is posed,
then A2 to Q1 (or to Q2) is proposed....

For this reason, it is important to know just what preceding statement(s) each question relates to, and just what question each answer relates to. The outcome is usually sorted out

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326 The modernism of flow-charts is significant; it shows how Jewish methodology may develop by absorption of new techniques from the surrounding culture. Another example of this is the work of the Ramchal, which we review further on.

327 P. 7.

with reference to the wording of the last answer. Questions may neutrally pursue information or signal fault-finding in a thesis and in some cases ultimately the defense of some counter-thesis.

An information question (*sheelah*) may seek the resolution of an independent legal issue, or the Torah or logical source of a statement; or the authorship and location of a citation, or some explanation; it does not in itself intend to put in doubt the authority or logic of a previous statement. Whereas an 'attack' question (*kushya*), seeks to show that (directly) some previous statement, or (indirectly) an implication thereof, is false or needing qualification or superfluous, by means of an authoritative quotation or logic; such questions may be quite long and composed by many components, each of which plays a part in the whole attack. The answers to questions may accordingly provide the requested information, or yield to an attack, by limiting the statement under attack, or making it clearer somehow, or parry or counter-attack, by weakening or discrediting the attack question somehow.

> A rhetorical question, one with an ax to grind, of course may or may not succeed in its intent to cause the rejection or adoption of a thesis: the intellectual impact of the *whole* discussion must be considered to evaluate the final level of credibility of each side. Note well the common faculty of logical intelligence which must perforce be assumed for all human beings, without which no rational consensus could ever be attained.[328]

b. Rabinowich's Talmudic Terminology.

1. **R**abinowich's work, which is my favourite, begins by studying **the terminology of the Mishnah itself**. We may characterize some of it as analytical and some as synthetical. Analytical terms may indicate what is included in or excluded from a proposition, to what or when it applies[329]; or compare and contrast items, for such purposes of classification; or order or hierarchize the various items under consideration, on some basis or other; or suggest implications[330]. Synthetical terms may give inductive evidence or counter-evidence, in support of or in opposition to a proposition[331]; or give some deductive (or, at least, inductive) reason (*taam*) for or against a proposition[332]; or define the sequence of development of concepts, as intellectual phenomena, or eventually as ethical precepts (this is done through terms like

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328 In this context, we should mention in passing the underlying assumption, adopted explicitly by orthodox commentators, that the Talmudic participants had all the necessary data at their disposal, exhausted the issues and drew the correct conclusions. In practice, this assumption has proven hard to uphold even in orthodox circles, since later commentators (as in different periods of the Talmud itself) have often enough found fault with Talmudic judgments. But in any case, such an assumption is impossible to uphold in theory, without recourse to a concept of miraculous knowledge. (We have had occasion to consider these problems.)

329 Using expressions like all, except, there are *n* kinds of, and so forth.

330 As for instance the phrase *zu veain tsarikh lomar zu* signifies that an item listed later is implicit in an item listed earlier (so that one may be surprised at the utility of such listing).

331 This, for example, may occur through the presentation of a relevant material case (*maaseh*).

332 Such as a Torah passage (*kra*), a common-sense or empirical intervention (*svara*), or an already established or generally accepted principle (*klal*).

lekhatechilah (*prima facie*) and *bedieved* (*ex post facto*), discussed elsewhere[333]); or describe the parliamentary process through which the authorities debated and eventually came to an agreement regarding some matter[334].

These broad categories are, be it said, applicable to Gemara as well as to Mishnah; however, the specific terms used to fulfill each investigative task differ considerably in the two texts. Moving on to a study of the Gemara's terminology, we find a richer field reflecting the increased complexity of its overall tasks, due to the fact that it is essentially a commentary on the Mishnah.

2. **The Gemara seeks first to clarify the Mishnah** through linguistic and logical analysis. Such investigations proceed by means of queries[335] which draw attention to an issue, following which a reply of some sort is sought. The questions and answers have standardized wordings for each kind of situation.

The *analytic* task of the Gemara is to determine the subject-matter precisely. It may clarify the wording of a Mishnah, its choice of words and sentence construction, progressively focusing on different details. Or it may make explicit the cross-references within sentences; or endeavour to understand the meaning of a term or proposition: what kind of thing it is intended to refer to; or clarify the scope of applicability of a term or proposition: what instances or subcategories of instances it is supposed to include or exclude, specifying any qualifications, limitations, unmentioned extensions, describing exceptions or different cases. Or it may describe the case at hand, or its surrounding context or underlying conditions, in more vivid detail.

The *synthetic* task is to investigate the processes leading to or supporting the Mishnah statement(s) at hand. Here, the Gemara labours to grasp the whys and wherefores of a statement, what knowledge it adds, what goals motivated its formulation, and what evidence or proof supports it, explicitly in the Scripture or indirectly by interpretation; or to draw conclusions from given statements, by eduction, deduction or inductive methods like generalization. Many of these concerns include issues relating to inter-rabbinical debate, such as the distinction between Babylonian and Palestinian opinions or between Babylonian schools, differences in the opinions of individual Rabbis or in the ways they derive their opinions, reasons for dissent, questions of authorship, all of which give an opinion a larger context.

Having determined what the Mishnah is saying, **the Gemara then checks it for consistency and draws inferences from it**. The Gemara looks for hidden incoherences. A Mishnah term, phrase or sentence may seem inappropriate or out of place in the context (causing the Gemara to reinterpret the passage or add clauses). A Mishnah may use different words for seemingly the same thing in the same passage or in different passages (in the former case the Gemara regards them as equivalent, in the latter case as incongruent). It may superfluously repeat something apparently already said or state the obvious (in which event

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333 In an ethical sense, these terms institute a distinction between two types of permission: 'may be done unhesitatingly' (*lekhatechilah*) and 'is acceptable only if already done' *(bedieved).*

334 Thus with terms like *machloqet* or *stam*, which tell us whether a given law gave rise to dispute or not; and in the event of conflict, various specifications of the participants - named or unnamed individuals, minority vs. majority, different schools.

335 Interrogations are usually rhetorical, so worded as to suggest answers. See further on.

the Gemara may interpose some specific difference or possible objection). A Mishnah's wording of a law or provision may appear overly vague or 'incorrect' to the Gemara (in which case the latter may emend or even put in doubt the authenticity of the former).

The Mishnah may seemingly redundantly mention analogous cases side by side (this is presumed by the Gemara to be in anticipation of possible objections due to minor differences in the cases, implying such differences to be in fact incidental). The order of presentation of classes may be surprising, in view of their habitual hierarchy. Or a listing of cases may be surprising, in view of the a-fortiori inclusion of one in the other (in such event, the intention is merely to emphasize the climax or anticlimax involved, the hierarchy). The Gemara may consider a Mishnah list of the cases included in a category as too limited; or notice that only some of a specified number of subcategories are listed; or find the definition of a category too broad, due to omission of relevant differentia, misleadingly suggesting more cases than intended. Or again, a Mishnah may present a rule as 'general' which is not really general according to the Gemara[336].

Various sorts of conflict may be spotted in a Mishnah by the Gemara: a decision in a Mishnah may be contrary to already established principle; or two parts of a Mishnah seem to have incompatible implications; or there may be different decisions in two areas, which should have been the same; or a conflict may be found between authoritative passages; or a case may be presented which is contrary to the law preceding it. Such inconsistencies are reconciled by assigning the conflicting passages different meanings or applications, or different authors - which are constructed by the Gemara, backwards as-it-were, from the case under review.

Acknowledged *disputes* in the Mishnah are analyzed by the Gemara. The Gemara may elucidate the reason why a Mishnah sage dissented, and the reply of his opponent(s) to his objection, or, in the absence of an explicit reply, itself offer a reply. The Gemara may contrast two or more seemingly identical legal opinions in the Mishnah, or point out the different principles underlying conflicting opinions, possibly by inferring divergent implications from them. Or it may indicate the areas of agreement between conflicting opinions, and limit the differences between them to specific issues; or clarify why a certain dispute in one case does not extend over to another case. The Gemara may focus on the apparent inconsistency of a Mishnah disputant, who seems to take different positions in two passages; it may suggest that, in one of the passages, he is reporting another sage's opinion (rather than his own) or that another sage is (wrongly) attributing an opinion to him. The same may occur for two disputants, in which event their opinions in one of the passages may be regarded as having been accidentally interchanged.

3. **The Gemara uses special words to quote from the various authoritative documents or oral sources.** Thus, the expressions *matninan, tenan,* among others, will refer to Mishnaic sources; *matnina*, *tenu rabanan*, *tanya*, etc. to Baraitot; and for instance *tena,* to Tosefta. A passage quoted is bound to be directly or indirectly relevant to the presentation or discussion at hand, the purpose of such quotation being, for instances, to illustrate or explain, support or undermine, qualify or amplify. After quoting a passage *a propos* of some other topic, the Gemara may later return to it and discuss it further for its own sake.

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[336] We have the same problem in English, where the word 'general' often means 'in most cases' rather than 'in all cases'.

A ***memra*** is a "reported teaching, opinion or decision of the Amoraim", i.e. *reported* by an Amora in the name of *another Amora* (that is, Gemara sage). The report may, according to the expression used, concern a single, undisputed statement (*amar* R. Ploni[337]), or a single, contested statement, without its counter-thesis (R. Ploni *amar*), or a controversy between two or more Amoraim (*Itamar* R. x *amar* ... R. y *amar* ...). The name of the reporter may be given, and it may be made clear whether the report is direct (first-hand, oral transmission) or indirect (hearsay, via an intermediary).

A *single* memra may be received in the Gemara in a variety of ways. A memra may seem superfluous, because already found ***ex***plicitly in a Mishnah: but in such event, the memra usually brings some additional new point. If the memra is only ***im***plicit in a Mishnah, the 'duplication' is not an objection to the memra, since it performs a useful function and is corroborated by the Mishnah. If a memra is found to be corroborated by a Baraita, one need not wonder at its superfluity, because ***an Amora is expected to know every Mishnah, but not every Baraita***. A memra may seem to be in conflict with a Mishnah or Baraita, in which event the former may be rejected, unless the said conflict is shown to be merely apparent. A memra may be brought in to confirm another memra (e.g. a Babylonian supported by a Palestinian). If two Amoraim report opposite memras regarding the same topic, the original authors of the conflicting positions will be assumed two/different persons. A memra's authenticity may be put in doubt by some other participant, on the basis that its alleged author expressed different opinions elsewhere; since both the reporter and the objector are Amoraim, their status is in principle equal, and some reconciliation must be sought (though in some cases one side may win). A memra may at first be strongly objected to, then finally admitted by the Gemara in rectified form to allow for the objections.

A *multiple* memra, reporting conflicting opinions, may be variously dealt with in the Gemara. The source of the conflict may be that a Mishnah expression was interpreted in different ways or that the reason for a ruling was understood in different ways. Or the dispute may reflect a doubt regarding the final decision in a case; or about some legal principle not clearly stated, or concerning some subsidiary case not considered by the Mishnah. The Gemara will look for and consider the different practical consequences of each position, identifying points of agreement and eliminating them from the discussion. The Gemara may then arbitrate (supporting one side, rejecting the other) with reference to a Mishnah or Baraita, or find therein support for both (or neither?), or subject the arguments pro and con to evaluation by common-sense, or find reason to admit both sides (no deep dispute being apparent, only a different case or circumstance of application), or even remain undecided. Sometimes, the wording of the memra leaves unclear which of the conflicting Amoraim held which of the two opinions: in such situations, and other doubtful situations, the Gemara may look at previous pronouncements of the Amoraim in question, to determine their previous lines of thought. Sometimes, the divergence between Amoraim may be rooted in a similar divergence between Tanaim.

4. **Questions are often rhetorical**, serving to put forward a foregone conclusion: an intent to affirm (X is) may be cast in the form of a negative question (isn't X?); an intent to deny (X is not) as a positive question (is X?). However, interrogations are usually way-stations

[337] 'R. Ploni' - refers to any given Rabbi, as we would say 'Mr. so and so'. *Amar* means 'said'; *itamar*, 'it was said'.

in the Gemara's inquiries. Four kinds are distinguished. (a) Questions expressing astonishment at some *unexpected* statement or inquiry contrary to what is obvious; such questions may serve as sufficient answer or may result in a more developed reply. (b) Questions asking for the *meaning, reason, sources or purpose* of some statement or part thereof. (c) Questions which raise an *objection*, pointing to a difficulty or conflict...

> A retort to an objection is termed *peruka* (to redeem, rescue). A difficulty is termed *kushya*, and its resolution, *terutz*; the latter may be a single thesis, or multiple theses (two or more alternatives of equal force given), or a thesis offered then contested. A difficulty may, however, remain without resolution. There are various kinds of disagreement, incongruity or contradiction. Contrasts between statements of equal authority, such as two Scriptural passages or two Mishnah and/or Baraita passages, are termed *rumia* (to cast in opposition). Conflicts of statement by an Amora with the higher authority of a Tana are termed *tiuvta* (Aram.; Heb. equiv. *teshuvah*). A distinction made, with reference to the cases or circumstances concerned, between statements seemingly in conflict, to show their compatibility, is termed *shinuia*.
>
> An objection may be countered by revealing a dilemma (*ma nafshekha*, what is your wish) - such that one way or the other a similar objection (or defense) may be raised. *Lo tsrikha* signifies the possibility of a further alternative, such as a middle ground, which dissolves the dilemma; *leolam* (still, nevertheless) signifies the maintenance of one of the alternatives, though possibly with small modifications[338]. An objection may, after attempted replies, be reinforced by a "rejoinder", which serves to invalidate proposed replies, showing them somewhat weakly argued, or not sufficiently wide-ranging in their considerations, or merely relative to opinions not universally held.

(d) A question may be used to point out a problem (*baayah*) - that is, any sort of doubt with regard to the interpretation of wording of a Mishnah, or the legal decision in a case (of practical significance, yet not provided for in the Mishnah), or the source or reason for a law. The solution, if any, is a Baraita or an Amoraic statement, and may be indicated by the verb *pashat*. If no solution is found, they say *teku* (let it stand). Sometimes, problems within the possible solutions to a problem are anticipated, to intensify the initial problem. Sometimes the issues raised are simply ignored, being too petty or theoretical (unlikely to arise in practice).

Various terms and phrases are used to introduce an argument, i.e. the reason (*taam*) used to prove or disprove any matter. The argument may start with premise(s) or with a conclusion. 'Direct' arguments show the truth of something; 'indirect' show the falsehood of the contradictory (a sort of *reductio ad absurdum*). The following classification of arguments is proposed. (a) Argument from authority, called proof or evidence (*rayah*), are the overriding basis of Jewish law; this may comprise a Torah, Mishnah, or Baraita text or an Amora's teaching or a "Sinai tradition" or an "established principle"[339]. (b) Argument from common sense (*svara*)[340]. (c) Argument from careful analysis of construction and implication of law (*diuqa*), including inferences from positive to negative or vice-versa, based on *davqa* reading

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338 If one of the given alternatives is modified, however slightly, to dissolve the dilemma, it becomes, of course, strictly-speaking, a new alternative. This should be emphasized.

339 It is not clear to me how the last two subcategories can differ from those which precede them: how is a tradition or a principle known other than through a textual or oral report? and at what point is a tradition or principle regarded as "generally accepted" enough?

340 It is not clear to me what distinguishes this category from the next three. In any case, the form of reasoning is unspecified (deductive, inductive; categorical, hypothetical, disjunctive; syllogism, production, apodosis, etc.); it may be, since the author may not know these things, that the varied wording indicates some formal distinctions - but I doubt it, offhand.

of law. (d) Argument by analogy (*heqesh* or *dumia*[341]), the similarity of two cases being used to extend a decision made in one case to apply to the other case as well. (e) Argument *a-fortiori* (*qal vachomer*), by means of which a law's applicability is extended from one case, where circumstances are less favorable, to another, where they are more favorable; in Hagadah passages the expression used is *al achat kamah vekamah*.[342]

Refutation means showing a proposition false: by disproving it (*tiuvta*, to reply), or overthrowing the arguments supporting it, i.e. rebuttal (*pirka*, to break in pieces, *dechiah*, to push over)[343]. *Disproof* may be direct, showing a conflict between the statement in question and a Mishnah or Baraita, or indirect, showing that if the statement were accepted then a certain Mishnah or Baraita would have been expressed differently or would be unexplained. *Rebuttal* depends for its method on the type of argument attacked. If the argument is by authority, it is shown to be based on misunderstanding of the passage it refers to; or it is shown that the passage refers to other cases than those under consideration; or it is shown that the passage referred to is *not* authoritative, being an individual opinion not accepted by all. If the argument is by common-sense, it is shown that its approach is logically faulty or another approach is shown better (*adaraba...*, on the contrary...); sometimes, note, the objection raised is mild/polite, not strong/decided, it is merely pointing out a certain *possibility* which could invalidate an argument, showing that alternative approaches are available, without implying these to be superior or exclusive or established. If the argument is by construction or implication, it is shown too arbitrary, since the same construction or implication applied elsewhere (to another clause of the same passage) could lead to contradictions (between the conclusions drawn from the two clauses); such rejections are often found in Talmud[344]. If the argument is by analogy, the resemblance between the cases equated is shown superficial, significant differences between them having been overlooked. If argument is indirect, it is shown that a similar objection as was raised *by* the argument can be raised *against* the argument itself or its conclusion. Many arguments are rebutted by showing that their implications are excessive in some way, leading to inadmissible side-conclusions in addition to the conclusions aimed at.

Besides minor discussions, consisting of punctual questions and answers, objections and rejoinders, etc., there are more elaborate debates (*pilpul*[345]) in the Gemara, usually concerning the interpretation or applications of a law or the development of a new general principle. These debates were between equal members of an academy or a teacher and his prominent disciples. Only the names of important participants are mentioned in the text, the rest remaining anonymous. The list of pilpul debaters is on the whole rather limited; for the rest, their discussions are more restricted in scope.

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341 I wonder if there is a difference between these two words.

342 Why are the other of the Thirteen Midot not included in this list?

343 In the case of '*pirka*', note that one has to be careful of *the fallacy of denying the antecedent*! i.e. 'If argument, then conclusion; but not argument; therefore, not conclusion' - is fallacious. The author seems to ignore this danger.

344 P. 69.

345 This term, '*pilpul*', acquired pejorative connotations in later times, when it was used to denote expositions of the law based on hair-splitting distinctions, creating artificial 'problems' whose eventual 'solutions' merely served to demonstrate one's dialectical skills. This form of study started in Poland with R. Yacov Polack (1460-1530), and was looked down on by many authorities; it persists still today in some circles.

c. The Ramchal's *Ways of Reason*.

The two books above are modern, though quite traditional presentations of Talmud heuristics. It is worth our while to look also into a rather older work, *The Ways of Reason* (in Hebrew, *Derech Tevunot*) by R. Moshe Chaim Luzatto, also known by the acronym RaMChaL[346]. What distinguishes this work (in my view) is that it purports to be at once an aid to Talmud study and a discourse on logic - a logic resembling, and no doubt influenced by, Western logic of Greek origin.

The Ramchal was born in Italy early in the 18th century, later emigrating to the Netherlands[347], and in his brief life-span of four decades, he wrote several books on various subjects (ethics, theodicy, Qabalah), which have deservedly become classics and are still widely read in Jewish religious circles today. His work is distinguished by its clarity of exposition, and the ability to organize and order traditional ideas. *The Ways of Reason* is an intelligent, readable work, on the whole; but exceptionally for the Ramchal, I am sorry to say, it has many serious flaws - perhaps he wrote it in a rush[348].

The Ramchal seems to be to some extent acquainted with Aristotelian thought, but not as fully as one might expect from a reading of the latter's works. Most important, the Ramchal seems totally *unaware of the formal-symbolic method* of logical analysis which Aristotle inaugurated; his approach is to describe features and processes in general terms, and appose examples from the Talmud. Consequently, his logic is a mere sketch, at best an outline, of the subject, apparently without awareness of some deeper issues in it (like, validation), and without an acquaintance with the technical tools which had been developed by that time (like, squares of opposition); also, he does not systematize, nor make exhaustive analyses. On the other hand, his range is somewhat wider than that of logicians up to his time, evidently because of his Talmudic background.

In his listings of logical tools and processes, the Ramchal tends to mix apples and oranges. All propositions are put on the same level; they are not classified with reference to their structural differences, nor are their structural relationships brought out. Thus, for instance, we find (in ch. 3) an inventory which lumps together actual categoricals ("simples", according to the translators), modal categoricals ("qualifieds"), exclusives, exceptives, ethical conditionals ("conditionals"), hypotheticals, propositions with two or more subjects or predicates in conjunction or disjunction ("compounds"), and others still. There is no analysis of the features of these propositions, no groupings are attempted, no explanations given.

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346 I had occasion to read his book while at a Yeshivah a few years ago, and made a few rough notes about it, which I used to write the following comments; but it should be said that I do not have the volume itself under my eyes as I now finalize these comments.

347 If I remember rightly.

348 Let me say in passing that the English translation that I read, by Rabbis D. Sackton and Ch. Tscholkowski, is not very good. They did not take the trouble to study the widely accepted terminology, and so tend to confuse a reader who has already absorbed it. For instances, they use the word "categorical" instead of general or universal; the word "particular" instead of singular; the word "partial" instead of particular; or again, the word "unqualified" instead of unquantified. Likewise, what the translators label "diametrically opposed", trained logicians call contradictory; and what they label "contradictory", we call contrary. I will just ignore such deviations and discuss the content using accepted terminology (and perhaps mention theirs in brackets and inverted commas).

The doctrine of oppositions and eductions of the Ramchal (in ch. 4) is complicated by his attempt to compare propositions with different terms. Obviously, his frame of reference is Talmudic debates; there, propositions with different subjects and/or different predicates are dynamically interrelated; the Ramchal seeks to address these practical issues immediately. But in Aristotelian logic, such issues cannot be dealt with directly; it is only at a later stage, through the theory of the syllogism, that they can be formally resolved[349].

It is interesting that (in ch. 5) the Ramchal adopts the Talmudic, rather than the Aristotelian, interpretation of particular propositions (i.e. as definite, rather than indefinite). That is, "some X are Y" excludes "all X are Y" and includes "some X are not Y". He does not, however, so far as I recall, make a distinction between deductive and inductive contexts, nor realize that the said relations are sometimes in the last analysis overturned. With regard to syllogistic argument, I find no fault in what he says, except that he does not say much (see ch. 7). There is no discussion of the figures of the syllogism, or of its various moods, nor of the processes of validation - yet these matters are the most impressive achievements of Aristotelian logic.

This is what is missing throughout the Ramchal's treatise: formalization, systematization and exhaustiveness. Did he not know all about the syllogism? Perhaps he never read about it, but merely learnt a little on the subject by word of mouth or absorbed it osmotically from the surrounding culture of his time.

The Ramchal additionally mentions some other forms of mediate inference, including apodosis (hypothetical or disjunctive "syllogism"). He mentions argument by analogy: X1 is like X2, in that they are both Y, and X2 is Z, whence X1 is Z, pointing out that such arguments can be rebutted. As well, he mentions *a-fortiori* argument, in the form: X1 is greater than X2, and X2 is Y, therefore X1 is Y; we may notice, however (see chapter 3 of the present volume), that the middle term which explains and justifies the process, being *the respect* in which X1 and X2 are compared, is lacking, and also that he is not apparently aware of the formal varieties of the argument (but the form of his argument is correct, as a positive subjectal).[350]

For the Ramchal, logic is something we grasp intuitively (ch. 1). He distinguishes literal truth from the allusive, the figurative, the hyperbolic (ch. 6). He is sensitive to the dynamics of reasoning (ch. 8, 9). He is aware of many of the categories which our conceptual faculties tend to refer to (ch. 10, 11).

> If the purpose of *Ways of Reason* is to give Jewish students of the Talmud a raised awareness of the underlying logical issues, then I would say that it is valuable. It is not a copy-cat compilation, but a thinking man's reflections on the subject. If however those who read it think that they are getting a proper concept of what the body of knowledge called the science of Logic has to offer (or even, had to offer, in the Ramchal's time), I would say they are misled[351]. There is more to the subject than *Ways of*

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349 We could, indeed, expand the theory of factorial induction, to deal with combinations of propositions with terms forming syllogistic patterns. In this perspective, syllogisms with one conclusion are deductive, those with two or more possible conclusions are inductive. In the latter cases, where there are a plurality of conclusions, the conclusions may have formally different degrees of probability, so that one may be ab initio preferable to the others. This work is yet to be done systematically.

350 Note that all symbols introduced here are my own.

351 I am an admirer of the Ramchal's other works, but in this case I am rather disappointed. If I seem critical, my intent is constructive; I am not provocatively looking for faults, but trying to make a fair evaluation.

Reason lets on. The book is interesting, but not necessarily the best primer. Its chief advantage is the kind of examples it gives; but there are better organized and thorough teaching tools today. Students can always find appropriate examples for themselves, in the way of an exercise.

5. The Hebrew Language.

Logic and language are intimately bound up in Jewish thought. Interpretation of holy texts for the derivation of laws presupposes a profound acquaintance with the Hebrew language, in its every little detail; its spelling, its grammar, its etymologies, its every living nuance[352]. Judaism has for a very long time, if not from the outset, openly claimed a deep relation between (most) words and things, deeper than the common wisdom that words are all merely arbitrary labels, mentally attached to our ideas about things.

> To be sure, logicians nowadays have a sense that there is close bond between the phenomena of language and those of logic, but it is not quite clear to anyone why that should be. For thought seems to be possible without words; modern psychologists acknowledge the existence of subconscious, even unconscious, "thoughts". Certainly, the peculiarities of a language can occasionally force those who use it to think in patterns which are not logically necessary; and even though, in most cases, such distortions can fortunately be bypassed by careful rephrasing (or parenthetical explanations and disclaimers), people do not always correct the effect, and cultural habits of thought may indeed emerge. But there may be still deeper structural forces at work, in the mind and its physiological supports, which shape both the thoughts and the language in which they are expressed, and in their variations produce different cultures.

Let us consider the genesis of the Jewish ideas about language, in its main lines.

First, within Jewish tradition. In the very first chapter of the Torah, which describes the Creation, we find the sentence (in verse 3): "And God said: let there be light, and there was light". God created by *saying*. In a sense, then, *words* were among the first creations, at least preceding the creation of light (and, similarly, other phenomena mentioned thereafter); and they were used as effective instruments for the creation of what they referred to[353]. And since the original report of these events, in the Torah, is in Hebrew: "*Vayomer: yehi ohr*", it may well be assumed that the language in which God spoke these words was the same.

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352 To a large extent, our knowledge of Hebrew is only acquired through analysis of its use in the Torah itself, for instance by medieval Spanish-Jewish grammarians; but Hebrew has also remained a living language in restricted circles through the centuries of our dispersion, until its Zionist revival in modern times.

353 The idea that the world was created through words is found also, seemingly independently, in Indian philosophy. "Sound" vibrations are there considered the building blocks and ultimate essences of matter. Knowing since Newtonian physics that sound is in fact transmitted by the vibrations of atoms, and is absent in a vacuum, this Indian notion would seem discredited or at least in need of modification. However, the Indian idea is probably based on meditative experiences, which means that it refers to mental sound, i.e. the sound proper inside the head after the ear-drums have done their work. Such sound can also be produced by the imagination, and therefore may conceivably antedate matter. The Christian Bible begins with the sentence "In the beginning was the Word..." (John 1,1), which is regarded as derived from Judaism and Greek Stoicism, via the '*Logos*' concept Philo of Alexandria (*c*. 20 BCE-c. 50 CE).

> The *Qabalah* (the mystical tradition) drew on this evidence in the Torah, according to which words preceded other things, to justify its view of the Torah as antedating the material and spiritual Universe, and as having effectively served as its blueprint in the Maker's mind. We are taught: just as a human architect needs a plan before he can build, so divine acts are preceded by divine ideas[354].

In the second chapter of the Torah, we are told (v. 19-20) that after the Lord God formed the beasts of the field and fowl of the air, He "brought them unto the man to see (*lirot*) what he would call them; and whatsoever the man would call every living creature, that was to be the name thereof. And the man gave names to all cattle, and to the fowl of the air, and to every beast of the field".[355] This report, taken alone, could be taken as a support for the theory of words as man-made conventions; but I have seen commentaries which interpret it more radically, in view of the preceding report concerning creation through words. Note that Adam is reported as, specifically, understanding Hebrew (e.g. Genesis 1:28) and speaking it (e.g. 2:23).

According to some Jewish commentators, the first chapter teaches us that Hebrew words somehow reflect the essences of things; in that case, the second chapter teaches us that Adam was able to directly apprehend the names in things (what he would call them). The phrase "to see"[356] could be understood as simply referring to the Lord God, observing the man's reactions, in the way of an act of quality control; in which event, the sentence "And the man gave names" would be explained as an affirmation of the efficacy of his perceptual/conceptual intuition of the essences: he uttered the correct names, and thereby confirmed his mental faculties. But the alternative commentary interprets "to see" with reference to the man, as seeing, in the sense of intuiting, the word-essences imbedded in objects (what philosophers would call the universals, plus a verbal component).

These explanations suggest that words have, not only an audible and utterable sound, but also a visible shape; they have two aspects or components, which are metaphysically allied, rather than accidentally paired together. The sound and shape of words are, in that case, two expressions of an identical phenomenon.[357] We may find further Biblical confirmation of this concept in Exodus 20:15, "they saw the thunderings...," which Rashi interprets as meaning that the Children of Israel reached a cognitive level where they could see the visible aspect of sounds. The shapes in question, according to Jewish tradition, consist of Hebrew letters, in the very form found today in our Torah scrolls.

> Note well the claim by tradition that the beautiful so-called *Ashuri* script was the original form of Hebrew. Historians would rather consider as more ancient the somewhat different and more primitive-looking Hebrew alphabet, which archeology shows was popularly used in early times and

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354 See, for instance, Scholem.

355 Note however that *plants and minerals* are not mentioned. As I recall, the reason for this given by commentators, no doubt on the basis of the rest of verse 20, i.e. "but for Adam there was not found a help meet for him," is that Adam was, as he named things, considering their potential as mates. While the animal world could be imagined as fit for that role, the vegetal and mineral could obviously not.

356 In 2:19, above quoted.

357 I seem to recall books on Jewish mysticism explaining the phenomenon in question as a fundamental vibration of some sort. Whether these are relatively recent, and products of Christian and ultimately Oriental influences, or original Jewish ideas, I do not know. The question requires much more study than I have put into it. It is interesting that the Heb. word *devarim* may mean "things" or "words".

> which seems to have been the source of derivative Greek, Latin and Arabic alphabets. The characteristic answer of tradition is that the *Ashuri* style was esoteric, lost to the crowd but kept alive by a select few.[358]

Furthermore, the Torah teaches us that, at the time of the Tower of Babel story, "the whole earth was of one language (lit. *sfat*, tongue) and of one speech (lit. *devarim*, words)" (11:1). The Torah narrative continues, concerning the children of men, "the Lord said:... they have all one language"; and then, in view of people's misbehavior, he decided to "confound their language (*sfat*), that they may not understand (lit. *yishme'u*, hear) one another's speech (more precisely, *sfat*, i.e. language)" (11:6-7). This episode, together with what we mentioned previously, gave rise to the Jewish doctrine that *all languages stemmed from Hebrew*.

> Incidentally, "tongue" may refer to the physical and mental apparatus, the faculties, which make possible the articulation of "words"; this would explain why it is reported that people's tongues, rather than words, were confounded. Differences arose in the *pronunciation* of words by different human families, with the letters in words changing to others (like the Japanese saying "r" instead of "l" when they speak English), or being reshuffled, added or dropped; and eventually in the *connotations* and then *denotations* of words. However, empirically, differences such as those in accent seem to be largely acquired rather than hereditary, and evidently we were left with the power to learn each other's languages (and, in some cases, imitate each other's accents).[359]

The Torah as a whole is of course a written document. But the first *explicit* mention of writing *within* the Torah seems to be in Exodus 17:14 (I have verified it in a concordance). The Lord says to Moses: "Write (*ktav*) this for a memorial in the book (*sefer*)... I will utterly blot out the remembrance of Amalek from under heaven." The text does not imply that this is the first time (it was in the 13th century BCE) that writing was ever used by men. Note that Moses already knew how to write (though he could conceivably have just been taught the art). Writing is again mentioned (24:4,7) in the context of Moses' writing of the "Book of Covenant" (which according to Ibn Ezra contained ch. 20-23 of Exodus); with regard to the first tables of the Law, written by the Lord (24:12) God (31:18, 32:15-16); and so forth.

However, Sforno interprets the word *vayakam* (arose, was made sure) in Genesis 23:17 as referring to a signed deed of purchase, suggesting that the first implicit use of writing in the Torah was at the time of Abraham[360]. In any case, the *Zohar* considers that calligraphy of the *aleph-bet* was known even earlier, to the first man, since Adam is reported in it to have even

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358 I found this argument in Munk, but it is also taught orally in some yeshivot. Lewittes just says that the script used for Torah scrolls in Moses' time was the ancient Canaanite, and that it was Ezra who had it replaced by the Assyrian script current in his own days (p. 43). The Talmudic references given are *Sanhedrin* 21b and *J.T. Megillah* 1:11. The insistence of orthodox commentators that the script used today is the original is needed to justify certain mystical interpretations of the shape of letters, and perhaps also some of the strict laws relating to writing of Torah scrolls in force today; but from a secular point of view the hypothesis of changes of script seems more credible. It should be pointed out, in support of the latter, that scripts used for Torah scrolls have demonstrably varied in recent centuries and from place to place: even today, Sephardim and Ashkenazim use different styles; for this, see the *Enc. Jud.*

359 Similarly, the graphical differences, which developed later, between the scripts of different language groups, might reflect varying artistic abilities (sensory-motor faculties) in the various human families, as well as environmentally-induced esthetic responses.

360 See Cohen, p. 121. Though I did look into Sforno's actual commentary, and asked many people, I still do not understand today the justification of this inference.

known that five of the Hebrew letters (*kaf, mem, nun, peh, tsadee*) have a different shape at the beginning and at the end of words; according to the same source this knowledge was lost, until the time of Abraham, who revived it "by inspiration".

All the above ideas had a strong, long influence beyond Judaism, notably on Christian and European thought (and also, presumably, on Islamic and Arab thought). Philosophically, these ideas had an innate credibility which was hard to ignore: they explained the power of language to recapture 'reality' and its various but related expressions, in different human groups as well as across time following changes in perception. The ideas that languages had one origin, and that it was namely Hebrew, were accepted from the inception of the daughter religion until the Renaissance.

Thereafter, gradually, with the birth and development of the branch of philosophy/science known as **philology**, the idea was viewed more and more critically[361]. More recently, the latter discipline has become known as **linguistics**, having come to include broader aims and methods, such as physiological, psychological, ethnological, sociological and historical studies[362].

Allegedly, science adopted a less prejudiced and more empirical approach, which resulted in the fragmenting of human language into geographic/genetic clusters, known as *families*, each of which evolved from a presumed *proto-language*, such as Hamito-Semitic or Indo-European[363]. With regard to the origins of the alphabet, for their part, secular historians, like F.M. Cross Jr., on the basis of archaeological discoveries, acknowledge that the art of writing by means of an alphabet originated in the Near East, at the latest in the 17th century BCE (it did not reach Greece until over a millennium later, incidentally). They do not, however, all admit Hebrew script to have been the first[364].

In fairness, whatever the true history of the alphabet, we must still keep in mind what historians teach us, that *literacy* arose well before its appearance. In other words, even if the alphabetic mode of writing was invented about during the time of the Patriarch Abraham, it still remains a fact that people were *writing* - using less sophisticated writing systems - before that time, for well over a millennium, and the genius this implies must be acknowledged. However if, as Jewish tradition suggests, the alphabet was merely *revived* at that time, having existed previously in a relatively widespread manner and then gone underground as the domain of a more restricted elite, then the idea of writing need not be attributed to the inventors of non-alphabetic systems, they merely invented specific shapes.

Concerning the history, I refer to McEvedy[365]: Early writing was done by inscription on stone (this is known as *epigraphy*). The Sumerian so-called *transitional* script, involving pictograms (pictorial representations of concrete objects), ideograms (conveying a more abstract idea relating to the objects), phonograms (transferring the reader over to other objects with similar sounds in their names, as does the rebus), and determinatives (unpronounced signs serving to switch the reader to a subsidiary class or sound of object), 'was in existence at the end of the fourth millennium' (BCE). The Elamites and Egyptians came out with imitations (using other, distinct symbol collections) 'soon after 3000'; the not-yet deciphered Indus Valley script would appear likewise to be a development from the Sumerian transitional.

The Sumerians eventually moved to a less pictorial script, consisting of wedge-shaped marks (impressed into clay tablets) and known as *cuneiform*. This method was adopted by Akkadians for their

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361 The story of this shift in the Western viewpoint is ably told in Foucault's *Les mots et les choses*.

362 See Akmajian, et al.

363 See *The Living Webster Encyclopedic Dictionary of the English Language*. Also, Akmajian, et al.

364 See Horowitz. Or better still, the *Encyclopaedia Judaica* article 'Alphabet, Hebrew'. I perceive in the insistent attribution of the invention of the alphabet to the Phoenicians, on the basis of Greek reports that they learnt it from them, an unfair prejudice, concealing some anti-Jewish tendencies. I mean, the early literary heritage of Jews (the Torah) substantiates the latter's strong affinity to written language; while Phoenicians were but a trading and pirating people, hardly likely to develop such a refined tool.

365 Pp. 26, 36, 44. See also Mitchell, pp. 31-35.

> own language, 'in the second half of the third millennium', soon after by the Elamites (who abandoned their own transitional script), and much later, through the Assyrians, by the Hittites, Amorites and other peoples. The Egyptians starting with pictorial *hieroglyphs* (so-called because used predominantly by priests), developed a more cursive script known as *hieratic*, which they wrote with brush and ink on papyrus (without however giving up on hieroglyphic writing). McEvedy adds: 'the remarkable feature of the Egyptian script was that only the consonants were represented'.
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> The cuneiform and hieroglyphic initially consisted of monosyllabic (e.g. 'mom') or even disyllabic (e.g. 'mother') symbols. By 'about the beginning of the sixteenth century', these were gradually replaced by *open syllabaries*, which being restricted to consonant-vowel syllables (e.g. 'ma'), reduced the number of symbols 'from hundreds to a mere eighty or so'. The Hittites and eteoCypriotes developed such scripts (perhaps based on the 'pseudo-hieroglyphs' of Byblos); and it is then thought that Minoan *Linear-A* script derived from that of the eteoCypriotes (though both are unreadable still, and thought to be open syllabaries only 'based on the number of signs they employ'), and the Achaeans' *Linear-B* from the Minoans. These kinds of scripts remained in use for centuries.
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> The *consonantal* alphabet, 'a Syro-Palestinian invention', seems to have appeared thereafter; this further reduced to about twenty the number of signs symbolizing consonants without vowels (e.g. 'm'). However, it may be, because 'there are consonantal alphabets both in cuneiform (Ugaritic script) and in a cursive based on Egyptian hieroglyphs (early Canaanite and Sinai script)' and 'some examples of early Canaanite' are estimated as dating from 'as far back as the eighteenth century', that the evolutionary sequence was the reverse and 'the open syllabary was in fact an expanded version of the consonantal alphabet for languages in which vowels were unpredictable' (unlike Semitic languages 'in which vowels occur in regular relation to the consonants'). By the ninth century, 'the early Canaanite has evolved into the north Semitic and split into the Phoenician (with a distinct variant for Hebrew) and the Aramaic' scripts, and separately into the South Arabian script.

Now, in my view, there is nothing inherently unreasonable in the Biblical thesis that one language and one alphabet (these are separate issues, of course) are at the root of all others. The idea is not obvious or inevitable. One could equally have supposed, and many ancients no doubt did so and many scholars today would tend to, that languages arose spontaneously and differently in diverse geographical locations; such a supposition is all the more easy with regard to alphabets. The issue is conceptually very similar, and somewhat allied, to the issue of human origins: are we all descended from common ancestors, as the Torah story of Adam and Eve affirms[366], or are different peoples different species?[367]

With regard to human origins, I imagine that it would be statistically well-nigh inconceivable that the various peoples arose/evolved in the world independently of each other, and yet accidentally ended-up with such overwhelmingly similar physiologies. With regard to the origins of language and alphabet, admittedly, the etymological relationships are not all immediately manifest and considerable study is required, but in any case the issue can and must be decided by the scientific method with reference to the evidence.

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366 Note in passing that any calculations by science of population growth, or of possibilities of genetic variation, to test Biblical claims, would have to proceed not from Adam time but from the Deluge, since at that point there were solitary pairs (or seven pairs in some cases, but the extras may have been sacrificed according to tradition) of land animals and birds (though not of fish) and a limited number of human beings, namely Noach and his family.

367 In this context, comes to mind *The Urantia Book* (anonymous; I lack the publishing information, but I would place it, on the basis of its ideas and the cultural context in which it made its appearance, North American New Age, as having been written and published probably by ex-Catholics in the 1960's or 1970's). I actually read this book many years ago, but about all that remains of it in my mind is its seeming radical division of mankind into unrelated racial groups.

Note that if the idea of a root language was, as some imply, merely a Jewish hypothesis (rather than Divinely revealed), it was by no means ingenuous, but truly ingenious. The claim reflected Jewish universalism, rather than a racist/nationalist particularism, because even though the original language was supposed to have been Hebrew, Judaism considers the Jewish people to have arisen quite late in world history, more than a century after the Confusion of Tongues incident[368]. Thus, the Jewish people have only considered themselves to be the trustees of the most ancient language and alphabet, not the inventors thereof.

It should also be clear that the thesis that there is one root language is not contrary to the current belief in proto-languages for language families (Indo-European, etc.), since it is conceivable that the proto-languages themselves have a common parent. If human groups had a common parentage, then their languages probably had a common parentage, reflecting the means of thought and communication of the very first human group[369]. The question, of course, remains: *which* parent? It may or not be Hebrew, or a Hebrew-like ancestor. Just as, say, Indo-European was projected by extrapolation from certain known languages (English, Latin, Greek, Sanskrit, etc.), with reference to their common properties and certain regularities in their differences (see for instance, Grimm's Law), so correspondences between proto-languages may be sought, and might well be found in Hebrew.

It should be noted in passing that there is so far no archeological evidence of the actual existence of proto-languages in some distant past (at least, not in the case of Indo-European); which is not surprising, since they are not assumed to have been written languages. Their existence is a scientific hypothesis, which so far seems justified. Furthermore, note, the similarities and differences, on the basis of which languages are grouped into families and distinguished from others, concern not simply vocabulary, but grammar too (e.g. inflection).

In conclusion, efforts being made to find a common root are in no way illegitimate or absurd, but certainly worthy of consideration. Especially worthy of mention, in this context, is the work of Mozeson of Yeshiva University. Not content to merely affirm in general terms, with a few examples, the Hebrew sources of (for example) the English language, as others had done before him[370], this author indefatigably set about constructing a detailed etymological dictionary, with umpteen examples, and identified many regularities in the transition from one language to the other.

Abehsera adopted a less doctrinaire, more phenomenological approach, and perhaps ranged a bit more widely into various languages (though never in as much detail). Instead of taking at the outset the radical position that Hebrew was the root of all other languages (and while not denying that doctrine), he proposed a method: that two dictionaries be constructed, one of all the homonyms (words which are similar, but may have different meanings), and one of all the synonyms (words which are different, but have the same meaning); and this, not only

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368 The patriarch Jacob was born in 2108 After Creation; the Confusion of Tongues occurred 112 years earlier in 1996 AC, according to Rabbinic inferences from the Torah text itself.

369 It is very significant, in this context, that the reconstructed proto-languages are not considered as having been more primitive than today's languages, e.g. consisting of a number of grunts, whistles and groans, or at least of very simple words and constructions, but rather they emerge as fully expressive verbal vehicles (see Akmajian, et al, p. 354). One might argue that this is due to proto-languages being mere imaginary *averages* of known languages; but it militates for the Biblical notion that early man was able to think and communicate fully.

370 e.g. Glazerson.

for each language, but for *all languages lumped together*. He went on to describe, with examples, the kinds of associations which may generate homonyms and synonyms, and gave interesting suggestions concerning their psychological undercurrents.

> A combination of the approaches of Mozeson and Abehsera would seem best, because the former seems to have a more thorough technical experience, while the latter comes with more systematic strategies. It is clear that the proposed collections of homonyms and synonyms (and eventually antonyms, one might add) should not be naive, but take account of Grimm's Law type of changes, referring principally to consonants, considering their substitutions, reorderings, additions and subtractions. Furthermore, vocabulary is not all of language, but grammatical construction must be taken into account. The programme may seem grandiose, but perhaps today with the use of computers such an effort becomes conceivable.

Another work worth mentioning in the same context is Biberfeld's *Universal Jewish History*. This is an older work, written and published in four volumes over a period of nearly forty years. It is unfortunately rather badly written, in my opinion, being crammed with repetitive notes; but one would wish someone would rewrite it briefly and to the point, and make its message available to the general public and to eventual researchers. Its purpose was to demonstrate that the Jewish traditions about language as such, and specifically written language (as well as similar traditions concerning the Noachide roots of the legal systems of the Nations), are compatible with available concrete *archaeological* evidence, as much as if not more so than some of the theses proposed by modern scholars. This is an issue which, of course, must always be addressed.

6. Further Notes on Harmonization Rules.

In this appendix, we shall examine some examples of "kol davar shehayah bikhlal veyatsa" exegesis, which the Rabbis, in my view, misclassify.

1. The goring ox. This example is given by Abitbol (quoting *Mekhilta, Baba Qama* 4:5), under the heading of rule No. 10, *shelo kheinyano*. As we will show (using the terminology established in the main body of the present work), it should rather have been classed as *shehu kheinyano*. It is best expressed in implicational form.

The law is found in **Exod. 21:28-32**, and concerns the penalty the owner of an ox must pay, if the ox kills someone after he, the master, had been warned of the ox's violent propensities. If the ox kills a man or woman, then the ox's master deserves death but pays a ransom for his life (major premise). If the ox kills a male or female slave, then the ox's master pays the slave's owner 30 silver shekels (minor premise)[371]. The conclusion of the Rabbis is that the penalty in the latter case, replaces rather than supplements, the penalty in the former

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371 According to Rashi: the ox is only an example, the same laws apply to other owned animals. The ox is known to be dangerous, because he has attacked people three times. The slave is a gentile. The 30 shekels are charged, whatever the market value of the slave, i.e. be it more or less than that. Note that if the ox's owner was not warned, he is not liable. Note also that the ox is to be stoned; since that clause is applicable in either case, it is irrelevant to the argument.

case; which means that the major premise is somewhat particularized (the 'man or woman' it refers to are, specifically, *not* 'a male or female slave').

The minor antecedent (P2) implies, but is not implied by, the major antecedent (P1), since the major antecedent's predicate (kills man or woman) includes, but is not included by, the minor antecedent's predicate (kills male or female slave), while the two antecedents have the same subject (ox); this is our antecedental premise, fulfilling one of the conditions for *kol davar shehayah bikhlal veyatsa* exegesis. The consequents of the two premises (Q1, Q2) are clearly *compatible*, since they have the same subject (ox's master) and their predicates could both be applied to it (it is physically possible for a man to both pay a ransom for his own life and pay 30 shekels for the slave), and this compatibility is not one of implication (since, whatever the amounts involved, the motives are different, one being explicitly specified as self-redemption, while the other appears to be a compensation for a property loss); this is our consequental premise, which fulfills the specific condition of *shehu kheinyano* exegesis.

The Rabbinic response, in this instance at least, is as follows. The major premise is particularized, i.e. it is read anti-literally, in order that its predicate not be applied to the minor subject; and the minor premise is not generalized, i.e. it is read exclusively, in order that its predicate not be applied to the rest of the major subject (even if, perhaps, some other species of the major subject behave like the minor subject, not all do). This result is not deductively imposed on us; but only possible. It cannot be deduced from the original premises, since it is in fact contrary to one of them (the major); nor was it called for by the original premises (including the predicatal), since they involved no conflict needing resolution. So, from the formal point of view, its adoption was an arbitrary act; or, more generously, an inductive postulate.

In material terms, it would not have been inconceivable for the Rabbis to require the master, in the case of a gored slave, to pay *both* penalties (note this well[372]). That they did *not* do so, seems in a wider context reasonable, insofar as slaves are 'customarily' viewed as inferior to free persons, so that the death of a slave is less serious than that of a free person. But the latter principle is a separate generalization, which cannot be used to confirm the Rabbis' conclusion, since it itself ultimately depends on that conclusion (and others like it). Furthermore, one can imagine another cultural context, in which the slave, because less socially important and thus more readily victimized, has more legal protection; so the Rabbinic conclusion is not formally inevitable.

> Note that, even though we know what, in this instance, the traditional conclusion *is*; and we know indubitably that the exegesis is objectively *shehu kheinyano*; nevertheless, we cannot say with certainty that this sort of conclusion is typical for the situation described, namely where the subjects are subalternative and the predicates are compatible without either implying the other. For the Rabbis evidently misclassified the case, as *shelo kheinyano*; so it is conceivable that, had they perceived the case correctly, they may have responded with another sort of conclusion. For where the predicates are incompatible, it is natural to keep them apart; but where, as here, they are compatible, it would be artificial to do so (granting all other things equal). We cannot legitimately, therefore, generalize from this case, and say that in all *shehu kheinyano* situations (where the predicates are compatible, etc.), the

372 Abitbol's claim that the predicates are incompatible, because the first is a *variable* amount (*x*, determined by the court) and the second is a *fixed* amount (30 sh.) does not hold water: what counts is that it is undeniably physically possible to be subject to both amounts (*x*+30). I mean, any two things you chose are bound to have differences; that in itself does not make them incapable of coexistence.

conclusion has to be a mirror image of that in *shelo kheinyano* situations (where the predicates are incompatible, etc.).

2. The manslayer. This example is given by Abitbol (quoting Rashi) and by Scherman, under the heading of rule No. 9, *shehu kheinyano*. As we will show, it should rather have been classed as *shelo kheinyano*. It may be expressed in copulative form.

Major premise: **Lev. 24:21** sentences to death a person who kills someone (without distinguishing between intentional and accidental killing). Minor premise: **Deut. 19:3-6** prescribes for the manslayer, such as[373] a person chopping wood who accidentally kills someone, a penalty of exile in a city of refuge. The conclusion drawn by the Rabbis is that manslaughter is subject to exile, but not to execution; so that not all killing, but only murder, is subject to the death penalty (particularization of the major premise). This conclusion is plausible, but the technical explanation traditionally given for it is inappropriate.

The Rabbis claim that this conclusion proceeds from R. Ishmael's statement that the minor term (manslayer) was singled out from the major term (killer) to be more lenient (exile) rather than more severe (death). They (see Scherman) imply that, were it not for that statement, we might have thought that both predicates are to be applied to the minor term. But, though exile can conceivably be combined with execution (in that sequence, though not the reverse), *the full text* (Deut.) clearly specifies that the manslayer "shall flee unto one of these cities *and live*" and "he was *not deserving of death*". Whence, the predicates *in fact* involved are indubitably incompatible (contrary), and R. Ishmael's said clause plays no part whatsoever in inferring the result (but is at best an *ex post facto* comment). Thus, the exegesis here consists in a reconciliation between conflicting propositions, exactly as prescribed by the rule *shelo kheinyano*: no differentia exists.[374]

Two incidental comments: (a) it is interesting to note Scherman's suggestion that the "exile is *instead* of the death penalty, not in *addition* to it", because this shows that in his mind compatibility between the predicates is a feature of *shehu kheinyano*, as I have postulated for formal reasons; (b) it is interesting to note the artifice that was used to mould the case in point to the format of *shehu kheinyano*, namely the passing over of manifest *explicit* text (viz. the words "and live"), which would be OK for illustration purposes but is not OK for Halakhic purposes.

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373 We may reasonably assume from the wording that the case of a slipped ax-head is meant as merely a sample of accidental killing. The case description starts with the expression *vaasher* (as when).

374 We may similarly show that Bergman's example for *shehu kheinyano* is in fact a case of *shelo kheinyano*. With reference to Lev. 13, briefly, the law for 'leprosy' (*tsaraat*), whose signs are a rising (*seet*), scab (*sepachat*) or bright spot (*vaheret*), is that a person so afflicted (S1) is to be secluded for a minimum of two weeks (P1), to see how the symptoms evolve; but for a person (S2) with a boil (*shechin*) or burning (*mikhvat*), the minimum seclusion is only one week (P2). Here, the predicates are clearly incompatible, and the Rabbis' conclusion is typically that of *shelo kheinyano*, namely that not all epidermal afflictions resembling 'leprosy' are subject to the two-week minimum of seclusion. (Note precisely how I express the subject of the conclusion, viz. broadly enough to *conceivably* include the minor subject at first sight; otherwise, if boils and burning were *immediately* recognizable as *not* symptoms of 'leprosy', i.e. if no confusion was possible with risings, scabs or bright spots, the minor term would not be subordinate to the major term, and there would be no need of a *shelo kheinyano*, or any other, exegetic process.)

3. The ex-leper. This example is given by Bergman, under the heading of rule No. 11, *lidon badaver hechadash*. As we will show, it should rather have been classed as *shehu kheinyano* or *shelo kheinyano*. It is best expressed in implicational form.

Putting it very simply for our purposes: **Lev. 7** gives laws concerning guilt-offerings (*asham*) and sin-offerings (*chatat*), including the statement (v. 2) "and the blood thereof shall be dashed against the alter round about". Further on, **Lev. 14** gives laws concerning, specifically, the guilt-offering of an ex-leper (a healed *metsora*), including a statement (v. 14) that blood of the sacrificed he-lamb is to be applied by the priest to various parts of the ex-leper's anatomy (right ear, thumb and big toe). The Rabbis, to my knowledge, conclude that *the rest* of the blood is to be dashed against the altar, as earlier prescribed.

Now, the *contents* of these premises and conclusion are given by tradition and as such accepted by me; however, tradition classifies the case under a different *form* than I do. Let us, therefore, examine the issues more closely, and find out who is right. Here, the major premise is 'if (P1=) a person makes a guilt-offering, then (Q1=) the blood thereof shall be dashed on the altar' and the minor premise is 'if (P2=) an ex-leper makes a guilt-offering, then (Q2=) blood of it shall be applied to the ex-leper'. First, we note that the minor antecedent implies the major antecedent (since an ex-leper is a person, and both are making a guilt-offering); this provides us with the required antecedental premise.

Second, with regard to the applicable consequental premise, if the major consequent is understood to mean that *all* of the blood shall be dashed on the altar, then it is incompatible with the minor consequent, which requires at least *some* of the blood to be otherwise used; in that event, the rule *shelo kheinyano* would be called for. But if the major consequent is read as saying that *an unspecified quantity* of blood is to be dashed on the altar, then it is compatible with the minor premise (since a bit of blood could be applied to the ex-leper and the rest dashed on the altar, as indeed occurred in practice); in that event, and since neither consequent implies the other, *shehu kheinyano* would be the appropriate rule.

a. Consider the *shelo kheinyano* reading. The premises are 'if (P1) a person makes a guilt-offering, then (Q1) *all of* the blood thereof shall be dashed on the altar' and the minor premise is 'if (P2) an ex-leper makes a guilt-offering, then (Q2) *some of* its blood shall be applied to the ex-leper'. The consequents are clearly incompatible, and the conclusion consists in particularizing the major premise to 'for some persons who make a guilt-offering, *some, but not all, of* the blood is to be dashed' and reserving the minor premise so that 'for a person who is not an ex-leper who makes a guilt offering, *none of* the blood is to be applied to right ear, etc.'. Thus, all inconsistency is removed and harmony is restored. This result matches the Rabbis', as above suggested.

b. Consider the *shehu kheinyano* reading. The premises are 'if (P1) a person makes a guilt-offering, then (Q1) blood thereof shall be dashed on the altar' and the minor premise is 'if (P2) an ex-leper makes a guilt-offering, then (Q2) blood of it shall be applied to the ex-leper'. Since the consequents are vague as to the amount of blood required for 'dashing' or 'applying', they are not incompatible. In such case, formal logic does not impose on us the Rabbinic conclusion, but only allows it as one possibility among others. This result is also, therefore, in accord with the Rabbis', since it grants the latter possibility.

Now, Bergman presents this case as an example of *lidon badavar hechadash*. Of course, he does not understand that rule as it was defined in the main body of the present work, so we will not criticize him by simply pointing out that no *actual class-changes* are involved in this example. Rather, let us consider his position in his own terms.

He says that "the placing of blood on the thumb and toe of the *metsora*... contradicts the general law," according to which the blood be "entirely poured out on the Altar." For this reason, the particular law "is adjudged a new case (see *Tosafos* to *Yevamos* 7a...)," and the major predicate "can no longer apply to" the minor subject, "unless the Torah expressly declares that" it does so. As it happens, in this case, "the Torah states explicitly: *as the sin-offering ... so is the guilt-offering*," and thus the minor term "is expressly restored" to the major term and premise.

My reply would be the following. If we read the major predicate as indeed a requirement that *all* the sacrificial blood be dashed on the altar, then indeed it is in conflict with the minor predicate, which requires that *some* of that blood be used for other purposes. But in that event, I would say, the exegesis has the form of *shelo kheinyano*, rather than *badavar hechadash*. Bergman indeed admits that both "reach the same conclusion," but claims that "they essentially involve two strikingly different situations." For him, in *shelo kheinyano*, the predicates are "conceivably...fundamentally distinct," whereas in *lidon badavar hechadash*, they are "essentially compatible" (even though elsewhere characterized by him as contradictory!). He gives no explanation of this difference, other than the circular argument that "a new law is stated... in a separate passage of the Torah" (note the eyewash word "new," inserted in his premises to justify his conclusion).

The truth is, then, that the example under scrutiny cannot be viewed as a case of *lidon badavar hechadash*. For if the example is indeed typical of it, this rule is redundant, being no different from *shelo kheinyano*. But since there exists a traditional example (presented earlier) of *badavar hechadash* which does distinguish it, this rule is not a repetition of *shelo kheinyano*. It follows that Bergman's example is misplaced[375], and can only be considered a case of *shelo kheinyano* (if "dash blood on altar" is read as "dash blood *wholly* on altar") or as a case of *shehu kheinyano* (if "dash blood on altar" is read indefinitely).

375 And incidentally, his claim that "it would have been possible to deduce rule X from rule XI" is untenable.

17. ADDENDA AND DIAGRAMS

The following Addenda and Diagrams were conceived and written after the Slatkine edition of 1997, and published in Ruminations (2005). They are added on to the present reprint to complete it.

1. Addenda to *Judaic Logic*

1 Concerning Adductive Reasoning Relative to Prophecy.

With reference to the adductive principles under discussion in chapter 2.3, relative to which we gave (p. 33) the example in 1 Kings 22 (or 2 Chronicles 18), the following remarks may be added.

We said that when Micah predicted the death of king Achav, he made a correct prediction, confirming his prophetic powers, though not proving them; whereas, when the 400 so-called prophets predicted the king's victory, they made a wrong prediction, proving their lack of prophetic powers, and not merely diminishing their credibility.

We could have added that Micah's credibility was double, in that he correctly predicted a negative event, which is harder to do since curses are to the last revocable by God. Similarly, the discredit to the 400 was double, in that they wrongly predicted a positive event, although blessings once decreed by God are irrevocable.

On another tack, I would like to reconsider the underlying distinction between positive and negative predictions. The Biblical passage 1 Samuel 15:29 would seem to contradict such a principle. Here, Samuel makes a negative prediction (that Saul will lose the kingship) and considers it irreversible (i.e. to be bound to happen, even if Saul should repent). Samuel says that God does not "lie or repent", apparently formulating a general principle.

If we review how the principle that prophesies of negatives are not inevitable (proposed by the *J.T.* and Maimonides, according to *Enc. Jud*.) is inferred from Jeremiah's statement in 28:8-9 (quoted on p. 32), we see that it is an *a contrario* inductive inference. That is, the principle about negatives is not deductively implied or explicitly stated, but merely assumed tacitly intended by the stated principle that prophesies of peace come to pass. Since *davka* positives only are mentioned, negatives are presumed excluded from the statement. Jeremiah does not actually say that prophesies of war and the like do not necessarily come to pass.

In fact, if we look at Jeremiah's statement more closely, he is not saying that prophesies of peace are inevitable, but that *when* they come to pass, *then* they will have manifestly come from God. This does not formally exclude that prophesies of war and such may be subject to identical rules. This issue of conditionality is already discussed in my text (p. 33).

We may conclude from all that: in some cases true predictions, whether positive or negative, are inevitable, while in some other cases they are conditional upon a continuation or change of

attitude or behavior. The de facto authority of the prophet and the actual outcome allows us ex post facto to estimate which category the case under consideration might fall under. But to the extent that some of those factors are tacit and informal, our assumption that they are implicit is inductive rather than deductive; i.e. we are interpreting rather than inferring.

2 A Note on Astronomy.

Concerning the astronomical information conveyed in chapter 2.4 (p. 37). I wrongly stated that our galaxy has some 100,000 stars (of which the Sun is but an average sized sample), and vaguely numbered a "multitude" of such galaxies in the universe. Forgive my ignorance.

I was myself amazed to read later (in a newspaper) astronomers estimate the Milky Way (our galaxy) as having 200 billion (i.e. 200,000 million) stars and the universe as having 80 billion galaxies with comparable contents each! That amounts, roughly, to:

16,000,000,000,000,000,000,000 stars.

Additionally, the diameter of the universe being estimated as 13.7 billion light years (give or take some), and a light year being 9.461 trillion km, consider the size of the universe in kilometers!

3 An Example of Secondary A-Fortiori in the Talmud.

I am in slight error (on pp. 74-75) when I say that, with reference to *Chulin* 24a, the statement about priests is not part of the *qal vachomer* argument per se, but a preliminary argument of another sort. More precisely, the statements about priests form a preliminary a-fortiori argument, of the type I called secondary a-fortiori (p. 54), consisting of suffective premises with a commensurative conclusion, namely:

> If a priest reaches a certain age (Q), he is *not* sufficiently unfit (R)
>
> to be disqualified (S);
>
> If a priest has bodily blemishes (P), he is sufficiently unfit (R)
>
> to be disqualified (S);
>
> therefore: For a priest to have bodily blemishes (P) implies more unfitness for Temple service (R) than for a priest to be past a certain age (Q).

The conclusion of this argument is then generalized, as I previously explained, by effectively dropping the specification of priests and making it applicable to all Temple servers. After that, the proposition can be used as major premise in an a-fortiori of the primary type, concerning the Levites, as already shown.

This discovery answers my implied question on p. 155, as to whether cases of secondary a-fortiori are indeed found in the Talmud.

4 One More Example of A-Fortiori in the Tanakh.

An acquaintance of mine and reader of *Judaic Logic*, Mark Leroux, has in 2001 rightly pointed out to me an additional a-fortiori argument in the Bible, in 1 Samuel 17:37. The passage reads (New York: Judaica Press, 1976):

> *And David said, "The Lord who saved me from the paw of the lion and the paw of the bear, He will save me from the hand of the Philistine"*

Although this statement is not per se an argument, but has an assertoric form (that of a blunt statement of fact), David's underlying thought-process is indeed *kal va-chomer* (we encountered a similar situation in chapter 6.3, with reference to Daniel 2:9). I easily constructed a positive predicatal a-fortiori reflecting this thought-process, by proposing an appropriate middle term (say, *favoring by God*):

"God must favor (R) someone at least as much to deliver him from big wild animals (P) as to deliver him from big seasoned warriors (Q); David (S) was favored by God (R) enough to be delivered from a lion and a bear (P); therefore, David (S) will be favored by God (R) enough to be delivered from Goliath (Q).

Notice that I used the egalitarian form of a-fortiori (major premise with "*as much as*"), which suffices to make the point without too much assumption. But Mark Leroux suggested a bolder, and finally more convincing, interpretation to me.

He pointed out that the lion and bear were innocent animals, merely attempting to feed themselves, and yet God favored David over them. In contrast, the Philistine was a willful enemy of His people, so God had *all the more* reason to favor David over him.

In other words, David's argument could be cast as "If God gave me victory over innocent beasts obeying their natural impulses, he will surely give me victory over a rebellious brute out to upset God's plans." The result is the same, but the argument is more forceful.

Finally, looking at the Hebrew version, we note first that it contains no logical operators (such as *ki*); but this does not detract from its being an argument, as we have seen in many previous cases. Furthermore, it contains no keyword (such as *ve-ekh* or *halo*), let alone a novel one which might have helped us to discover yet other, similar cases through a concordance.

I want to underline here that Biblical a fortiori arguments usually require interpretation, in that they involve tacit elements, usually the major premise at least. This can also be illustrated with reference to the following two cases (paraphrased).

In 2 Samuel 4:10-11, David states that if he sentenced to death the man who brought him tidings of Saul's death (whom the man claimed to have killed at the wounded Saul's own request, see chapter 1), how much more will he so deal with the two men who brought him tidings of Ish-Bosheth's death (whom they had murdered in his bed). The major premise of the argument being that the latter crime was greater than the former, either because of the circumstances or because of the comparative innocence of the victim.

Similarly, in 2 Samuel 16:11, David states that considering that his own son, Absalom, was seeking his life, how much more could one expect Shimei, a Benjamite supporter of the late Saul, to express opposition to David. Here, the major premise would be that Shimei compared to Absolom either had a better pretext for his actions or that they were less dangerous.

5 A Note Concerning Anachronisms.

In chapter 9.1 (page 140, footnote 153), I noted in passing that Numbers 31:22-23 suggested that iron-working in Israel had begun in about 1300 BCE, whereas modern historians placed this event in about 1000 BCE. This remark implied a possible error in the Biblical account, and a source of doubt.

However, subsequent readings, relating to the Hittites[376] (who it turns out inhabited a large portion of the Near East region, from modern Turkey down to Israel), have taught me that archeological sites suggest iron working in the region dates from the 14th-13th Cent. BCE, and texts suggest a date as early as 1800-1700 BCE.

This rather confirms the Biblical claim on this subject.

Notwithstanding, while on the subject of Bible criticism based on archeological findings, I would like to add the following. Faced with apparent anachronisms in the Biblical account, many archeologists tend to overreact (with conscious or unconscious ideological motives, one may suspect).

For instances, the story of the Patriarchs in Genesis mentions Philistines and camels – and yet, according to archeology (i.e. physical traces so far uncovered – or not uncovered), Philistines did not appear in the Land of Canaan till a few centuries later in about 1200 BCE, and camels did not appear there till still later in about 700 BCE. Some historians conclude from such apparently factual data that the story of the Patriarchs was invented, accordingly late in Hebrew history.

But, even assuming the empirical findings indubitable (though, note well, these are often negative, and so less certain than positive findings), such a conclusion is unnecessarily extreme, for it is logically equally conceivable that there was an older and more skeletal Patriarch story and that this was later embellished with anachronistic elements. It is not incredible to suppose that early commentators embedded their comments in the received text (whereas later commentators, such as the writers of the Midrash, avoided such direct interpolation).

One must always be ready and willing to adapt to developing factual evidence. But generally speaking, it is logically permissible (if not often preferable) to retreat gradually and reluctantly from a favored position, yielding only step by step, rather than to surrender everything abruptly and take on a radically contrary position.

Of course, in either case, if the empirical evidence is incontrovertible, the inference one can draw from such anachronisms is that the text, whether partly doctored or wholly fabricated, is to at least some extent post-Exilic.

6 Inferences from Context.

The argument I give as example of contextual inference (on p. 159) can be formalized as follows:

(a) Murder is a capital offense	A is E
Adultery is a capital offense	and B is E
therefore (because textually adjacent)	but C is next to A, B
stealing is a capital offense	therefore, C is E

[376] Notably O.R. Gurney's *The Hittites* (England: Penguin, 1952. Rev. ed. 1964).

(b) but also, of the kinds of stealing,	however, of all C
only kidnapping is a capital offense	only D is E
therefore, as intended in the Decalogue,	therefore, here
"stealing" means "kidnapping"	C means specifically D

Thus, judging from this traditional example, inferences from context can be expressed to some extent in formal terms, their common property being a proposition like "C is next to...". However, such argument has varying force, in view of the vagueness of the copula "next to", and its inevitable irrelevancy in some cases (as I have argued, there has to be changes of topic).

Note that only (a) is contextual inference; (b) is an additional argument, which takes off from a foregone conclusion (of here unstated source) that kidnapping is a capital offense, and infers that the term stealing in the previous segment was intended to refer specifically to theft of people.

7 Post Hoc, Ergo Propter Hoc.

I have suggested in my analysis of *binyan av* (pp. 160-162) that the Rabbis often commit the fallacy[377] of *post hoc ergo propter hoc* (after this, therefore because of this). This consists in interpreting a sequence of events as causal, rather than merely coincidental, without proper justification.

This kind of thinking is hard to avoid in the context of a closed book like the Bible. Because the characters and events in it seem exemplary and final, we are tempted to *accept them as empirical data and generalize from them* to our heart's content, without regard to inductive rules. The Rabbis were conscious of the dangers of excess involved. For instance, that people might wish to imitate Pinchas and kill out of some moral indignation[378]. In such contexts, the Rabbis would designate the event as somehow unique and limited to particular circumstances or to the time and place. The problem is of course that they were not consistently rigorous in their interpretations.

When we read the stories in the Tanakh, we naturally get influenced one way or the other by the characters and events. Indeed, this was the writers' intention. Writers of religious books, like those of philosophical or political tracts, like many novelists or film-makers, and indeed journalists (who mostly do not report facts but fabricate propaganda), all want to influence people. It doesn't take much, because people (especially youth, but also tired souls) become absorbed in the fictional universe involved, and identify with certain characters and take example from their attributes, responses and behavior patterns, little realizing the enormous power of the author over his creation.

It is also worth keeping in mind that the practical success or failure, or the beauty or ugliness, of such qualities and behaviors, are very often a function of the social milieu. In a theocratic regime, fanatic acts may seem sane and admirable, while rational acts may seem weak, stupid or immoral. In a secular society, depraved or nonsensical acts may impress, while acts of

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[377] According to the *History of Philosophical Systems*. (Ed. Vergilius Ferm. Paterson, N.J.: Littlefield Adams, 1961. P. 67) hermeneutics for purposes of Halakhah consist of "strict logical rules". I quote this here quite incidentally, to show how far the myth of a Rabbinic logic is spread.

[378] The assassination of Y. Rabin comes to mind.

integrity or reason may seem old-fashioned, pompous or laughable. It is because appearances in these matters are very relative that fiction (in all its guises) can so easily manipulate people's emotions.

8 Judgment-Calls.

A notable feature of Rabbinic exegesis is its attempt to grasp the *impact* of the propositions in a text on each other.

We see from the example of the Rabbis' thought processes that a proposition, or set of propositions, may be considered (rightly or wrongly) to cause another to be particularized or generalized, or rendered exclusive or indefinite, or otherwise conditioned. Such dynamic causal relations are inductive, and are to be contrasted to the merely static oppositional relations found in Aristotelian deductive logic (where the respective truths or falsehoods of propositions are declared compatible or incompatible).

By such considerations, induction is raised to a more complicated level. It is a level at which the Subject is making more judgments (in the sense of judgment-calls), since he/she must try and estimate the relative credibility to assign to each appearance, giving this one or that one superior force, and thus decide somewhat the directions of his/her thinking processes[379]. And of course, it is precisely because of this subjective element inherent in judgment-call that the risks of wrongdoing are greatest in it. By that, I mean allowing one's judgment to be warped by emotional pressures, wishful thinking, dishonesty, etc.

9 Tolerance of Contradictions.

Judaic logic (together with the logics of other religions and mysticisms) is often conveniently tolerant of contradiction, in contrast to Aristotelian and scientific logic which uncompromisingly rejects contradiction. This is a fundamental distinction, due to attachment of the former to certain given beliefs, texts, doctrines and persons.

The religious construct their world view by tacitly accepting all manners of contradiction: between different passages of the Torah and Nakh, between competing statements of Rabbis in the same or different periods, between tradition and scientific discoveries, and so on. They imagine and posit as an article of faith *that* a resolution somehow exists, whereas the scientific demand a resolution to be found *before* accepting that there is one. Or perhaps more precisely, the religious presume a resolution compatible with their dogmas to exist, whereas the scientific presume a resolution exists but not necessarily one compatible with their pet theories.

I am sorry to say that Talmudic dialectic often makes me think of the liar who covers up his lie with another lie, and the latter with yet another, and so forth, till he has confused his adversary into silence. Each generation of Rabbis constructs an *evasive scenario*, to dilute the difficulties they find in the Biblical text or in previous Rabbinical discussions, and make them more palatable. Of course, such dissolution instead of solution, or explaining-away instead of explaining, has to more or less fit the prevailing orthodox views (though sometimes it does shock a bit initially).

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379 I have given more formal attention to these matters in the context of my analysis of factorial induction in my *Future Logic*.

10 Proof of God by Analogy?

I heard Geneva's Rabbi Marc Raphaël Guedj recently argue, in a sermon, that "just as Man's soul sees but is not seen, so God sees but is not seen". I have seen a similar argument in Rabbinic literature before, or perhaps it was the simpler proposition that God is to the world what the body is to the soul[380]. This is of course an argument *by analogy*. However, it should be noted that the analogy is *imperfect*, since we regard God as creating the universe whereas we do not regard Man's soul as creating his body[381].

In any case, we see from the above objection that, as I have always argued, though analogy is not in itself erroneous, it is rarely if ever conclusive. The analogy admittedly carries some conviction, but this must be weighed against the points of difference. There are always differences—otherwise the things compared would not be two but one! The issue is to estimate the significance of the differences. In the above case, as all will admit, our concepts of God and Man do not merely differ in scale.

Also, before we try to infer God from Man, we must more deeply consider whether our concept of Man is knowledge or theory. We (myself included) assume that Man has a 'soul' on the basis of the fact of consciousness: phenomena do not just manifest themselves, but they seem to appear *to* someone—a Subject seems logically required, which experiences things. Nevertheless, many people (in particular, Buddhists) deny this inference, and emphasize the transparency of the 'soul', its lack of concrete manifestations, to conclude that the existence of the 'soul' is an illusion.

Furthermore, solipsism remains a philosophical possibility (though not one I personally incline towards). I, the Subject, perceive some things closest to my apparent center of perception, which things I call 'my body'; and I perceive (more wholly, though less intimately) other bodies beyond mine, which resemble mine and behave like mine; and from that I conclude that 'there are other people out there', i.e. entities who are conscious, and seemingly volitional, and emotive, in short who seemingly like me 'have a soul'. But that inference, though a good working hypothesis, has no deductive certainty; it is still quite conceivable that the 'other people' I perceive are empty phantasms.

Clearly, these deeper doubts (though picky) make the argument by analogy we mentioned to start with even more tenuous. If Man's soul is in doubt, it cannot be adduced very convincingly in support of a world soul (i.e. God).

11 Disproofs of God?

a. The counterargument I have given (pp. 233-236), that *if the world requires explanation, how much more does God require it*, is an excellent way to neutralize certain traditional proofs of God. A Being capable of creating a world as great and marvelous as this, has to be still greater and more marvelous; to posit such a Being increases rather than decreases theoretical difficulties, and therefore presents no logical advantage.

This is comparable to the well-known counterargument that *if the world requires a cause, then so does God*, for if the antecedent is based on the principle that everything requires a cause,

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380 Which argument is, incidentally, found in Indian philosophy, specifically in Ramajuna (1100 CE). (See Ferm, p. 15.)

381 And in fact I doubt that the view that God is in a similar relation to the world as Man's soul is to his body is strictly kosher; it could be interpreted as a sort of pantheism, which the Rabbis dislike.

then the consequent has to submit to the same principle. In other words, the idea that everything has a cause is a thesis that the causal chain is infinite; we cannot therefore consistently use it to justify a first-cause thesis. I believe we must admit of first causes within the world—for instance, in freely willed acts by humans (influences on whom do not constitute causes in the deterministic sense here used); in that case, the world may need no cause or may have as first cause a causeless God.

We can join and contrapose the two statements and say *if God requires no cause or explanation, nor does the world*. My counterargument is I think original, but finally merely a broadening of an older counterargument[382]. In any event, these arguments do not disprove God, they merely neutralize alleged proofs of God; that is, they demonstrate that those so-called proofs are not conclusive.

b. I have said that you cannot conclusively disprove God, either. Sure, theodicy—since the Book of Job[383]—gives us ample reasons to doubt God, as we conceive Him through Judaism. *If God is perfectly just and full of love for His creatures, then how come terrible crimes are not prevented and innocent victims are not protected?* There is no excuse for such negligence[384]: if human freedom would have otherwise been impossible to create (as some argue[385]), there was still the option of not creating humankind at all (and regarding why we were created no plausible argument is found by anybody).

Such argument convinces many people that God does not exist, or at least that He is not as described by apologists, since there are evidently contradictions between the expectations raised by religion and historical and personal experience. Nevertheless, while powerful, such argument does not strictly disprove God: (i) What is just or unjust is sometimes if not always unclear or problematic; judges or jurors often disagree, for a variety of reasons. (ii) There may be hidden pathways to justice which in the long term restore the balance, as defenders of faith have often argued.

I am personally not greatly impressed by such defenses, for to (i) I would respond that only the (innocent) victim can decide whether it feels justly dealt with or not, if he/she is still alive and fit, and to (ii) I would respond that justice hidden or delayed is justice denied, the issue is prevention not mere cure. Nevertheless, we must grant that none of such arguments or counterarguments logically permits us to draw a decisive conclusion. Arguments from theodicy result in at best the improbability of the existence of God as we imagine Him (i.e. just and loving).

c. There is another old objection that puts God in serious doubt, or at least God as we conceive Him. It is: *if God is eternal, perfect, self-sufficient and satisfied, then He is immune* to any danger or desire, and therefore has no need or motive to create/destroy or pursue/avoid anything, no use for temporal things or events. God, alone, without need of others since

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382 Which I learned from Ayn Rand, but which I seem to remember Aristotle previously taught.

383 Incidentally, referring to my comments on p. 231 concerning those who add insult to injury, and without cause accuse all victims of crime or misfortune of having somehow deserved it. It occurs to me that Job had said it already, in his complaints against the unfair and unkind accusations by his three friends (see also Ferm p. 61-62).

384 To argue that 'God gives the criminal time to repent' is absurd, since the victim is thus forgotten.

385 But I do not see why a timely destruction of Hitler and his ilk would have been a problem. Since the world is well able to exist for long periods without such horrors, it follows that human freedom does not require them.

complete, with nothing to fear since eternal, would not suddenly put in motion unnecessary turbulences in His unity, generating lies[386] and suffering for no conceivable reason. He is not lonely or bored, nothing exists to affect Him or which is capable of doing so, so why would He bother?

I think this points to a weighty contradiction. What it means is that the *hypothesis* that a God exists with such and such characteristics (eternity, etc.) is belied by the *empirical data* that a temporal world at all exists (quite apart from the lies and suffering in it). Thus, what we apparently have here in inductive terms is not mere reduction in probability and putting in doubt of a thesis, but its decisive rejection and elimination. The world is not only not a proof, but it is a disproof of God!

This counterargument is not new to philosophy, but I failed to consider it previously and to see its persuasiveness. I was taken in by arguments found in Rabbinic literature, which referred to God's spontaneous will to create the world and humanity out of pure love, to share His life and joy—but now, upon reflection, I realize such theses do not stand to reason! It follows that we do not merely have (a) an absence of proof for God, or (b) complaints which make Him improbable—we have (c) in the very existence of a temporal world, an actual disproof.

But upon further reflection, I am not too sure of the finality of the above objection. For the description of God relied on here makes Him resemble a stone! We rather conceive God as in the image and likeness of humans, that is as having freewill (and that to an extreme degree). And I believe, though I have not yet demonstrated it, that freedom of the will conceptually requires the ability (though not necessity) to act quite anarchically, without purpose (not even the goal of acting without purpose). If this is indeed a characteristic of human volition, then there is no reason to deny a similar feature to Divine will.

d. Another influential argument in favor of atheism is the perspective modern science has given mankind regarding how very little space and time it occupies in this universe.

Modern science has of course raised considerable doubts about the veracity and accuracy of Biblical and other religious accounts, taken literally, of the universe and of mankind's position in it. Examples of such deficiency are countless. Critics often point out the numerous and important deficiencies of the Biblical narrative of Creation (e.g. with regard to the duration and order of universal development, the non-mention of extinct species and geological changes, and so forth); but there are many other issues (e.g. the proposed listing of ethnic groups and their relations). Also in other religions there are, according to modern science, serious errors (for example, the Hindu-Buddhist belief in an eternal cyclical universe).

However, the issue I wish to focus on here is not related to specific traditional claims, but has a more theological character:

(i) Although modern science has concluded that the universe is not infinite (but to date about 13.7 *billion light years* in diameter, according to some), it has also made clear how comparatively minuscule our home is (a planet some 12'750 km in diameter). We are living on *a mere speck of dust*, in one galaxy comprising some 200 billion stars like the Sun, in a world of some 80 billion galaxies (according to one article I read).

(ii) Also, our planet is a rather late arrival on the world scene (being some 4.5 billion years old, I read), and the human species as such is a very late arrival on it (although

[386] When I speak of lies here, I mean that if existence is essentially unitary, then it follows that the world of plurality is all illusions, and created illusions are lies.

> life is considered to have started here say 4 billion years ago, *homo sapiens* appeared in the evolutionary chain perhaps some 200'000 years ago). History (comprising the remnants of human culture) stretches barely 6'000 years (or rather, lately, some 10'000 years): it is a puny detail in the story of life on Earth.

Thus, modern science has shown mankind to be a very, very tiny detail in space and time – and the theological question naturally arises: *why would God create such a spatially and temporally enormous theatre, if His purpose in creation was only the drama of human redemption?*

Before the advent of modern science (starting with the Copernican revolution), people imagined their life at centre-stage, and the stage as not much larger than the earth and not much older than human history. But now we know ourselves to be a mere detail in a very grand tapestry.

Galileo was persecuted by some Churchmen, because they realized the danger he posed to their religious doctrines; and they were not far wrong in that assumption. Modern atheism is largely based on *the perspective* modern science (astronomy, biology) gives on humanity. Paradoxically, today's human arrogance is based on a humble realization of human insignificance in the larger scheme of things.

The issue is not only what the Bible stated incorrectly or did not say – but moreover an issue of dimensions, of the disproportion between us and the rest of the universe. This thought, tacitly or explicitly, is a strong force for atheism in today's world. Defenders of religion must take it into account and propose convincing replies. And indeed, upon reflection, the argument of perspective is not unbeatable.

We could turn it around and say: God made a world so enormous around us so as *to give us a hint of His infinite greatness*. Our whole universe, for all its immensity in our eyes, is perhaps in turn a mere speck of dust in God's eyes. The faithful have always acknowledged God's greatness in comparison to humans, and indeed have considered it an argument in favor of awe and worship.

Moreover, it could be argued that God also wanted *to give us a hint of His great love for us*. How so? If one considers a task of little worth, one devotes little time and effort to it. But God took billions of years of complex preparation before producing mankind – forming and destroying stars, forming our planet, developing life on it, making and breaking numerous habitats and species, until finally the (still very perfectible) human species emerged historically.

We may in this context, for example, quote Psalms 113:5-6:

> *Who is like the Eternal our God, Who, [though] enthroned on high,*
> *lowers Himself to look upon the heavens and the earth?*

Like an artist of great genius, God has created a massive masterpiece around the detail that mattered most to Him, to give it richness and depth. In His infinite love, He has made a free gift of attention and care to inferior creatures like us (a bit as if we were to adopt microbes as pets!)

12 Neither Certainty Nor Faith are Essential to Religious Ethics.

It has to be made clear that my insistent skepticism regarding religion, and the arguments in its defense, cannot be interpreted as categorical rejection of all religiously motivated behavior.

For even a secular ethics has to admit the inevitable limits of human knowledge. Many actions, whatever their standard of value, are *based on conditional judgments*.

We can never be absolutely sure that such or such a course of action will indeed lead to our goal, that it is the only way to it and will not have negative side-effects, that our goal really is consistent and feasible, and so forth. Things are not always immediately clear or predictable. Our actions are often based on hypotheses and on more or less accurate probability estimates[387]. Assuming this, I should do that. Supposing so and so, I ought to act thus. To be realistic, ethics has to adapt to our epistemological framework.

Thus, it is quite legitimate from the point of view of logic to motivate one's behavior by means of conditional judgments. There is no proof or disproof that God exists or is thus or thus; but *just in case* it is true, I will behave in such or such a way. Or again: I doubt there is life after death, or judgment and reward or punishment, yet just to be on the safe side, I will act *as if* I was sure.[388] Such judgments are not in any way logically reprehensible.

It follows that neither certainty nor faith are essential to religious ethics.

People are free to invest their efforts where they want, but of course they have to be aware that such courses of action, based on conditional judgments, have and are bound to have definite consequences of their own, whether in accord with expectations or totally unexpectedly. Gambling, however unavoidable, still involves real risk. That is, by justifying the form of such judgments, ethical science makes no claim that it is justifying their content!

Nevertheless, in many cases the consequences are clearly benign. If one goes to the synagogue occasionally, say for social interactions, one has at worst wasted one's time, which one might have wasted instead at the beach or shopping around. One could of course often argue the matter further (e.g. that by so doing one is reinforcing the power of religious cadres); but excessive rigidity can also be a disvalue.

13 The Rabbis' Antipathy to Philosophy.

In answer to the Rabbis' distrust of philosophy, and their attempt to muzzle it or its study at least, I say this. Philosophy is a necessity for humans; we have to research the issues for the sake of our sanity and survival[389].

Admittedly, to affirm that philosophy, as a science, as a disciplined pursuit of knowledge, is a valuable thing, is not necessarily to accept all particular philosophies, all attempted formulations of what philosophy's problems and solutions are. Philosophy is not a fixed monolith, as the Rabbis seem to think of it.

Nevertheless, philosophy is a trial and error process, and therefore all views contribute something to our collective understanding. Even wildly erroneous views, products of mixed-up minds, are interesting, in that they awake more intelligent philosophers to the need for appropriate comments in the area concerned. Often, what seems obvious to the latter is far

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387 In whatever mode of modality — natural, temporal, extensional or logical.

388 Such discourse underlies the Believer's Wager mentioned on p. 239.

389 Furthermore, one might argue: why would God not want us to enjoy the philosophical aspects of His world, whatever they are, just as we enjoy a sunrise, a flower or a fruit. Surely, He would take pleasure and pride in humans exercising the intellectual faculties He granted them to the full, and solving the riddles inherent in their limited perspectives on the world as best they can. But such argument is open to rebuttal: we have other capacities which God apparently does not want us to actualize, so why not those intellectual ones.

from obvious to others, and it is only when the others manifest their confusion that better thinkers realize they must be more explicit.

Additionally, Judaism often mistakenly prides itself in the originality of its explanations of things, while at the same time usually attributing them to Biblical personalities. Only by study of the actual history of philosophy can we be properly informed regarding the sources of our ideas, and when and in what context they made their appearance on the world scene.

I do agree with the Rabbis in this: the idea of God cannot be objectively discussed by someone with an impure mind – for an impure mind is necessarily biased away from or against this idea. A person whose thoughts (and consequently, eventually, actions) tend towards impurity is well nigh bound to doubt or deny God. Under the influence of powerful carnal and egotistic desires, one naturally opposes and mocks all ideas that demand one restrain or restrict one's 'evil impulses'. However, one must not allow one's good intentions to bias one's judgment, either.

14 In Defense of the Rabbis.

I recently overheard a congregant in a synagogue, during the third meal on a Sabbath, loudly declare for all to hear: "I fully believe in the Torah, but have no faith in what the Rabbis say – since they are only human!" (Let me hasten to add that this is a very surprising remark for someone attending a service.) Another congregant got very upset with him and (rightly) pointed out that this was the viewpoint of the Karaite sect (which split off from normative, Rabbinic Judaism as of the 8th Cent. CE).

Not keen to get into a shouting match, I did not get involved in the argument then. But after the service, I approached him and argued with him in private approximately as follows.

First, I pointed out, what you are saying is that only your own reading of the Torah is valid; in other words, while you claim to distrust human claims to knowledge, you are in fact considering your own claim exempt and superior. He of course denied having such arrogance, and included his own reading as flawed as that of any other person. He realized then the self-contradiction of his position.

Second, I pointed out, if you admit your own fallibility, yet your judgment is trustworthy enough to dismiss the Rabbis' claims, does it not follow that other humans, though sometimes perhaps wrong, may sometimes also occasionally be right? He admitted that indeed people were not always wrong, but could be right.

I pursued further: Does the mere fact that the source of some knowledge is someone else make it wrong? Is it not conceivable to you that someone else might have more knowledge or understanding of something than you, and might be able to teach you some of it? Are you not sometimes freely convinced by other people's arguments? To his credit, the man conceded.

Clearly, to deny the Rabbis invariable truth is not the same as to invariably deny them truth. If they cannot convince us of something – too bad. But if they manage to convince us of it in good faith – so well and good!

2. Diagrams for *Judaic Logic*

Some of the 13 hermeneutic rules of R. Ishmael can be represented graphically, at least in some respects.

1 R. Ishmael's Rule No. 1, concerning **a-fortiori** argument, can be represented by a *triangular star*, at the center of which is the middle item (R) through which the three other items, P, Q, and S are related to each other.

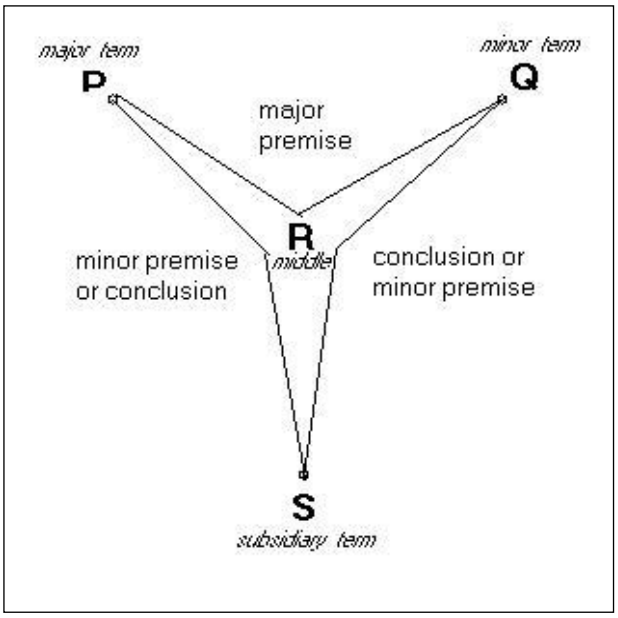

Diagram 1a

The **a-fortiori** argument may also be represented, with reference to the comparative propositions that underlie it, as ordering items P, Q, and S, according to their position in a *common continuum* R:

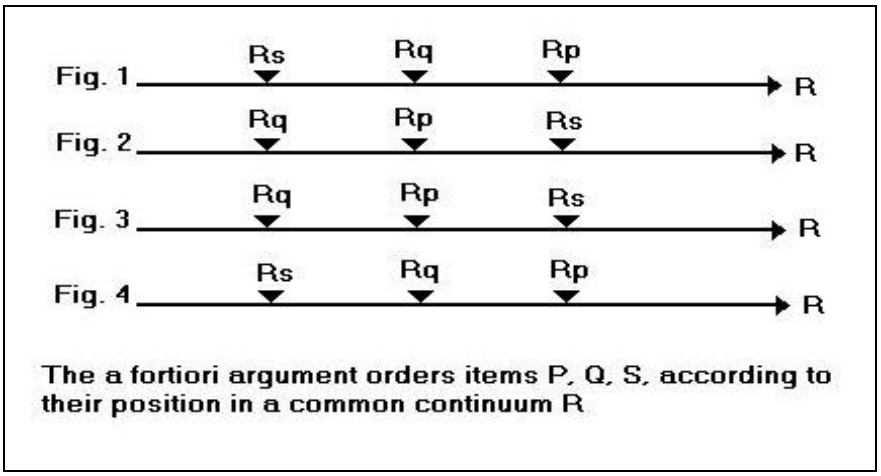

Diagram 1b

Figure 1	Figure 2	Figure 3	Figure 4
Rp > Rq	Rp > Rq	Rp > Rq	Rp > Rq
Rq > Rs	Rp < Rs	Rs > Rp	Rs < Rq
So, Rp > Rs	So, Rq < Rs	So, Rs > Rq	So, Rs < Rp

Note that the four figures of a-fortiori should not be confused with the four of syllogism they imply, which are, in the order shown: the fourth, third, first and second figures.

2 R. Ishmael's Rules Nos. 4 and 5, concerning the intended **scope of terms**, can be represented as follows. In the first case, the intent is narrow; in the second case, the intent is broad.

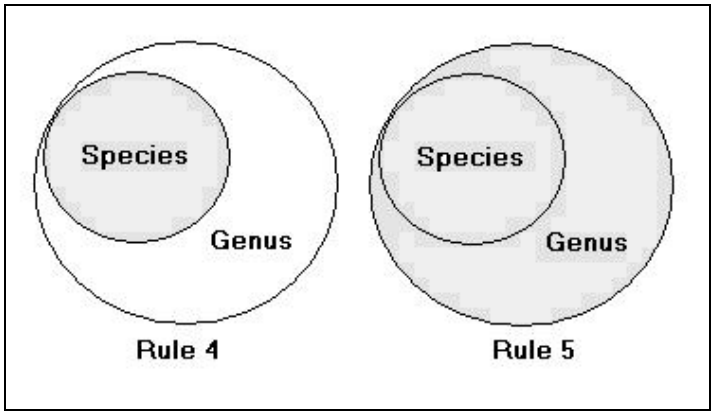

Diagram 2

3 Rabbi Ishmael's Rules Nos. 8-9-10, which are some of the Talmud's **harmonization rules,** are all concerned with the following logical problem, formulated with reference to the following diagram: *knowing the lateral relations between four items (the terms or theses, S1, P1, S2, P2, in the four premises a, b, c, d), what are the diagonal relations between them (i.e. the conclusions, e)?*

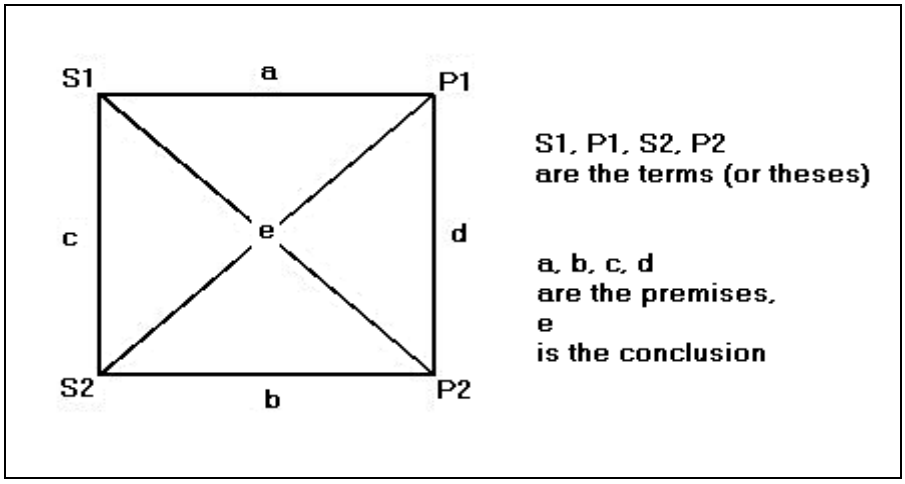

Diagram 3

Such arguments appear much simpler, if viewed as successions of Aristotelian syllogisms (which involved three items, in two premises and one conclusion). They may then be graphically represented, using Euler diagrams. Their formally valid conclusions are then manifest for all to see; and the invalidity of some Rabbinic conclusions is then apparent.

4 We suggested a general formula for the first three (actually, four) of the hermeneutic principles which begin with the phrase ***kol davar shehayah bikhlal veyatsa...***

Given the three premises, common to the four Rules:

1. Major premise: **All S1 are P1**.
2. Minor premise: **All S2 are P2**.
3. Subjectal premise: **All S2 are S1, but not all S1 are S2**.

and, the fourth premise, as applicable in each Rule:

4. Predicatal premise: The relation between P1 and P2.

What are resulting relations (conclusions)?

- Between S1 and P2 (main issue).
- Between S2 and P1.
- Between S1 and P1, other than the above given.
- Between S2 and P2, other than the above given.

The first three premises can be individually depicted as follows:

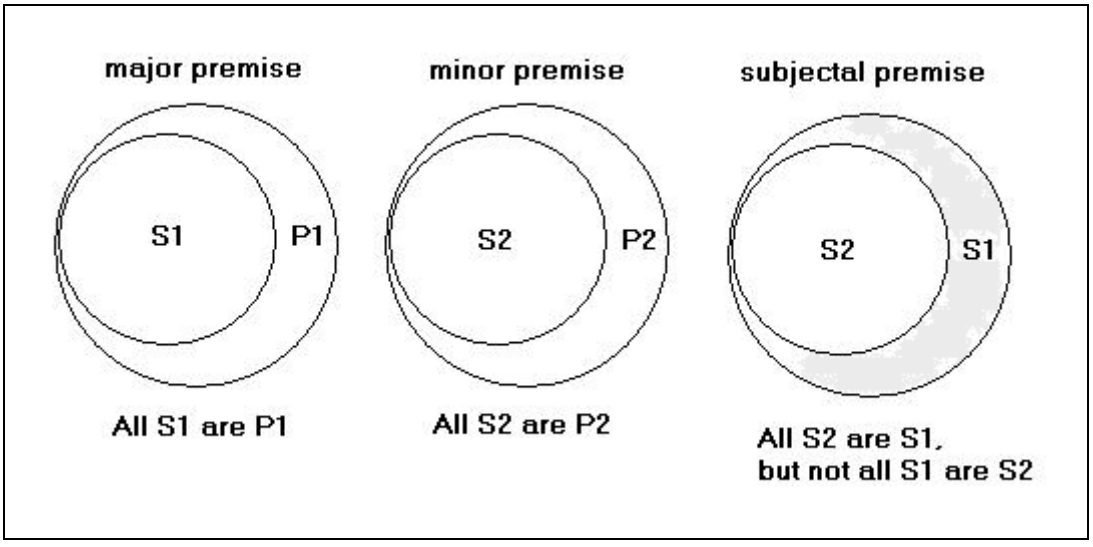

Diagram 4a

Note that the first two premises leave open the possibility that subject and predicate may be co-extensive, so that the circles labeled S1 and P1 might be equal in size, and likewise the circles labeled S2 and P2 might be one. On the other hand, the relation between S2 and S1 can only be as above depicted, with S2 smaller than S1.

As for the remaining (predicatal) premise and the conclusion(s), we shall consider each case each in turn.

But first, let us consider what general conclusions can be drawn from the common premises of all such arguments.

Given the major and subjectal premises, we can at the outset, without resort to the other premises, make the following syllogistic inferences and graphic presentation:

1/AAA	3/OAO
All S1 are P1	Some S1 are not S2
All S2 are S1	All S1 are P1
So, all S2 are P1	So, some P1 are not S2

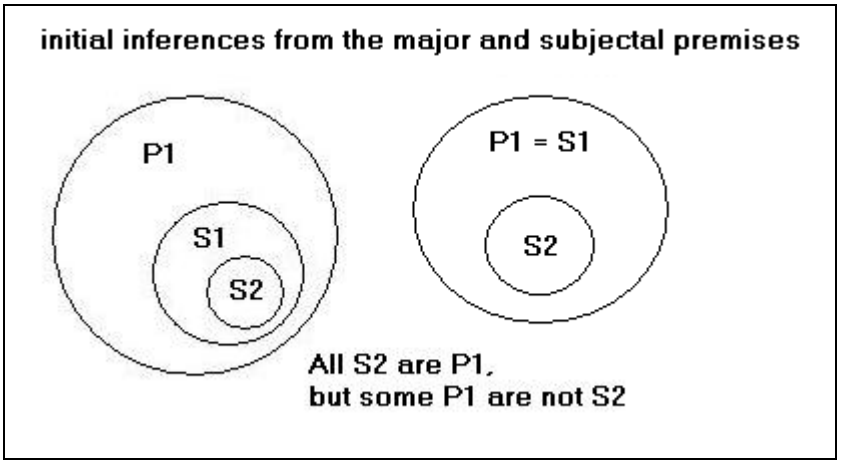

Diagram 4b

Note: I did not mention the above 3/OAO syllogism in my original treatment (p. 173).

It should, however, be pointed out that in the case of Rule 10, since the major premise is particularized in an effort to restore consistency, these initial inferences become annulled.

Similarly, given the minor and subjectal premises, we can at the outset, without resort to the other premises, make the following syllogistic inference and graphic presentation:

3/AAI
All S2 are P2
All S2 are S1
So, some S1 are P2

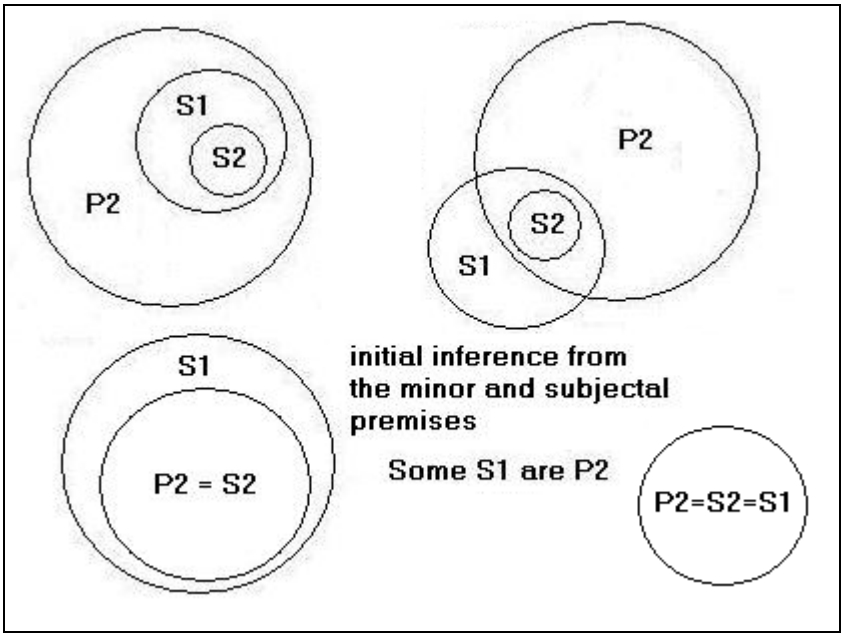

Diagram 4c

This conclusion is an indefinite particular, note – i.e. in some cases, we may find "All S1 are P2"; and in others, "Only some S1 are P2".[390]

[390] Quite incidentally, I notice while writing this that in *Future Logic* (p. 37), I state that the mood 3/AAI is a derivative of 3/AII; but it could equally be derived from 3/IAI. Similarly, 3/EAO could be derived from either 3/EIO (as stated) or 3/OAO.

5 R. Ishmael's **Rule No. 8(a) – "*lelamed oto hadavar*"** – the generalizing version of "*lelamed*", may be depicted as follows, since its fourth premise is:

All P2 are P1, but not all P1 are P2 (predicatal premise).

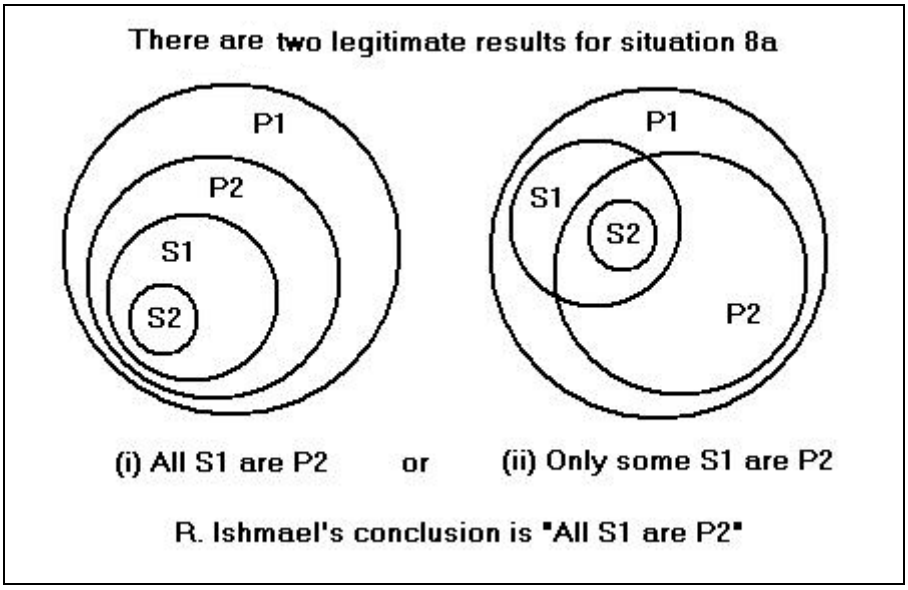

Diagram 5

The four premises formally yield the conclusion "Some S1 are P2" (etc.), which is compatible with the two outcomes shown in our diagram.

Rabbi Ishmael concludes (more generally and more specifically) that "All S1 are P2", which means that he at the outset generalizes the formal conclusion, and precludes the other formal alternative (some S1 are not P2). No reason is given for this hasty action. Thus, note well, although the Rabbinical conclusion is in this case compatible with the formal one, it is not identical with it. Strictly speaking, it is a *non-sequitur*. The best we can say for it is that it is a legitimate inductive preference to select the more general alternative; however, the Rabbis should remain open to occasional particularization of their conclusion, if it is found to lead to some contradiction elsewhere.

6 R. Ishmael's **Rule No. 8(b) – "*lelamed hefekh hadavar*"** – the particularizing version of "*lelamed*", may be depicted as follows, since its fourth premise is (note the reversal of order of the terms, in comparison to the preceding case):

All P1 are P2 (predicatal premise).

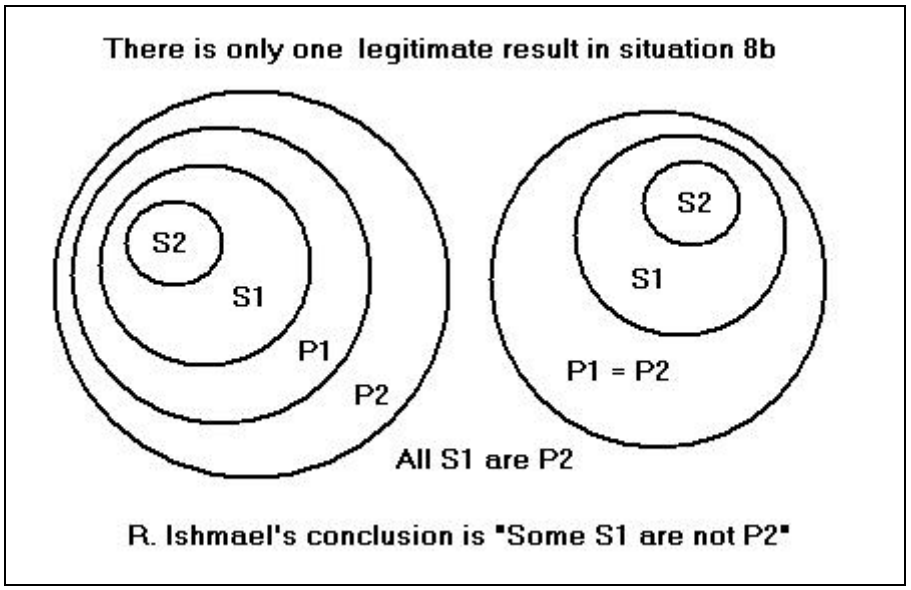

Diagram 6

The four premises formally yield the conclusion "**All S1 are P2**" (etc.).

Yet R. Ishmael draws the very opposite conclusion "Some S1 are not P2"! Why this upside down logic? Apparently, he mentally considers the premises in conflict, due to some perceived redundancy in the text, and seeks to harmonize them by excluding all S1 other than S2 from being P2. But such particularization is logically illegitimate, since there was in fact no formal conflict between the premises, and textual repetitions can hardly be considered as such. Judge for yourself.

7 R. Ishmael's **Rule No. 10 – "*shelo kheinyano*"** – is difficult to depict since it concerns a conflict resolution. Its fourth premise is:

No P1 is P2 / No P2 is P1 (predicatal premise).

As the following first diagram shows this premise is in conflict with the others, since if the circles representing P1 and P2 cannot overlap at all, then the circles S1 and S2 cannot satisfy all the given conditions regarding them. The problem can be faced in a number of ways:

(a) That is, if S2 is wholly in S1, and S2 is wholly in P2, then S1 cannot be wholly in P1. We could accept this and propose that S1 is partly in P1 – and partly (to an extent at least enough for S1 to cover S2) in P2.

(b) Alternatively, if S2 is wholly in S1, and S1 is wholly in P1, then S2 cannot be wholly in P2. We could accept this and propose that S2 is partly in P2, and partly in P1; but if we say so, we must also assume S2 is not entirely (but only partly) within S1.

(c) We might also resolve our dilemma by assuming S1 and S2 not to at all overlap, like P1 and P2.

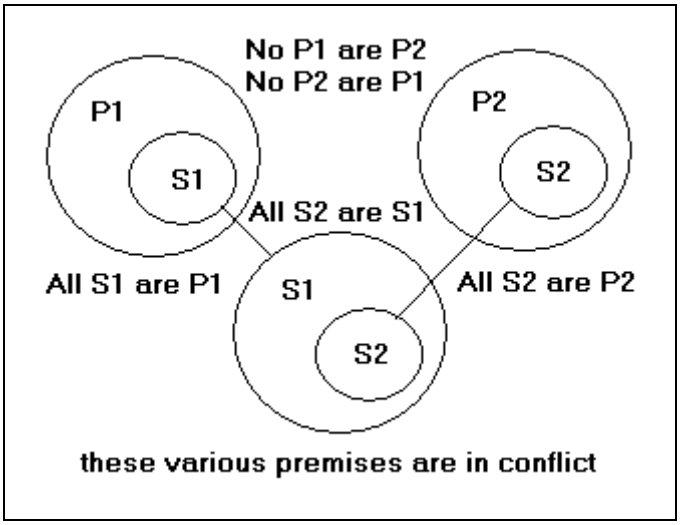

Diagram 7a

R. Ishmael's preferred option, for resolving the conflict dealt with by Rule No. 10**,** seems to have been (a). That is, he kept the subjectal and predicatal premises, and even the minor premise, unchanged and chose to tinker only with the major premise, concluding: "**Some, but not all, S1 are P1**". Diagrammatically, this Rabbinical resolution of the conflict looks as follows:

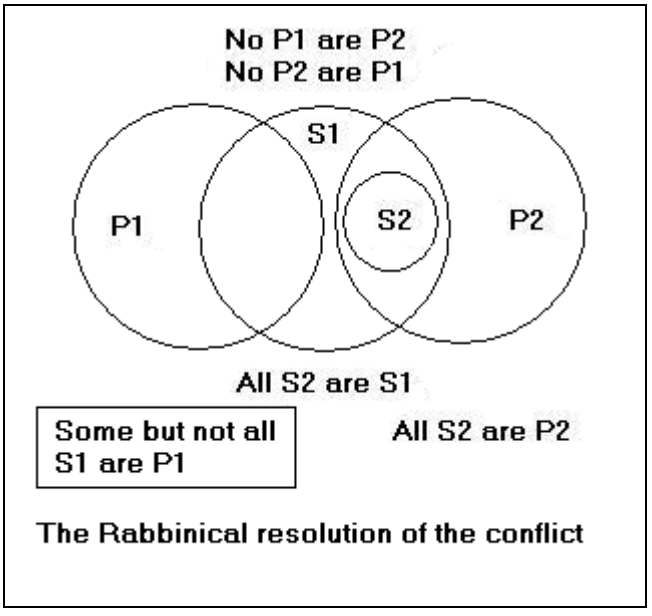

Diagram 7b

This is a formally acceptable option, even though not the only conceivable option. That is, though the Rabbinical response is not per se in error, it should be kept in mind by them that

other inductive responses are possible if the need arise, i.e. if this response later prove undesirable for some reason.

8 R. Ishmael's **Rule No. 9 – "*shehu kheinyano*"** – presumably has as its fourth premise:

Some P1 are P2 and some P1 are not P2, and
some P2 are P1 and some P2 are not P1 (predicatal premise).

This situation, where P1 and P2 only partly overlap, may be graphically represented as follows:

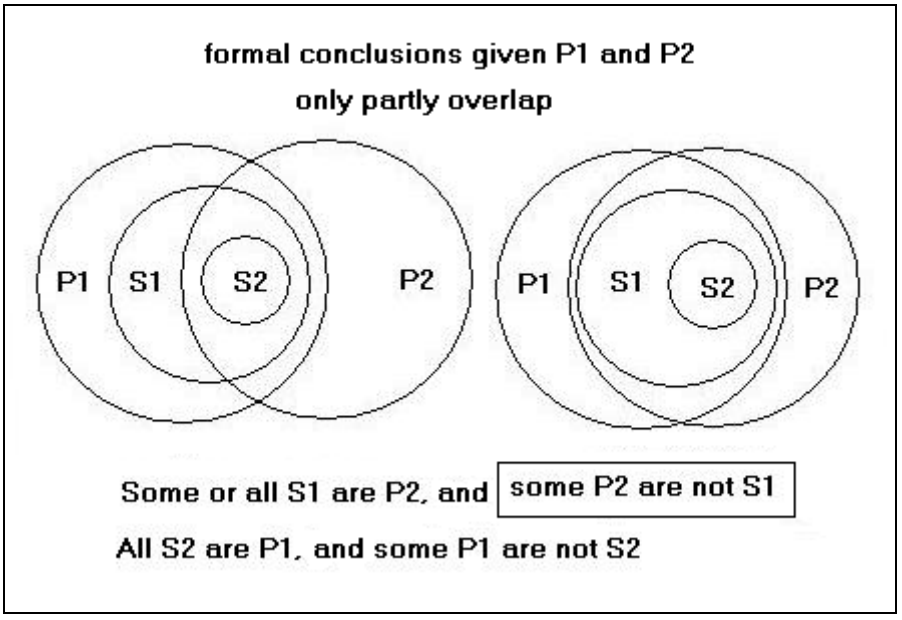

Diagram 8

The conclusions we can formally draw are obvious enough. Since "Some S1 are P2", as well as, "All S2 are P1" and "some P1 are not S2", are general conclusions possible from the first three premises, without resort to the predicatal premise – the only formal conclusion *specific to the current predicatal premise* is "**Some P2 are not S1**".

It is not clear (to me so far, at least) what R. Ishmael proposes to conclude in such cases.

9 R. Ishmael's **Rule No. 11 – "*…lidon badavar hechadash*"** – can also to some extent be represented graphically. Do not refer in the present case to the earlier common premises and conclusions (for Rules 8-10) – this is an entirely different situation. Here, we are initially given the premises:

All S1 are P1 and **All S2 are P2**

And we are told that an individual, say 'x', changes over time from membership in the class S1 to membership in the class S2. Whence, incidentally, by singular syllogism, x is initially P1 and later P2. Later still, x leaves S2 and returns to S1. Formally speaking, granting the given premises constant, there is no doubt as to the outcome of such return: **x must again be P1**. As to x's relation to P2, it depends on further conditions; for we are not told in the way of a general premise whether P1 and P2 overlap or not.

These formal considerations are illustrated in the following diagram (assuming here, for the sake of argument, that P1 and P2 are mutually exclusive):

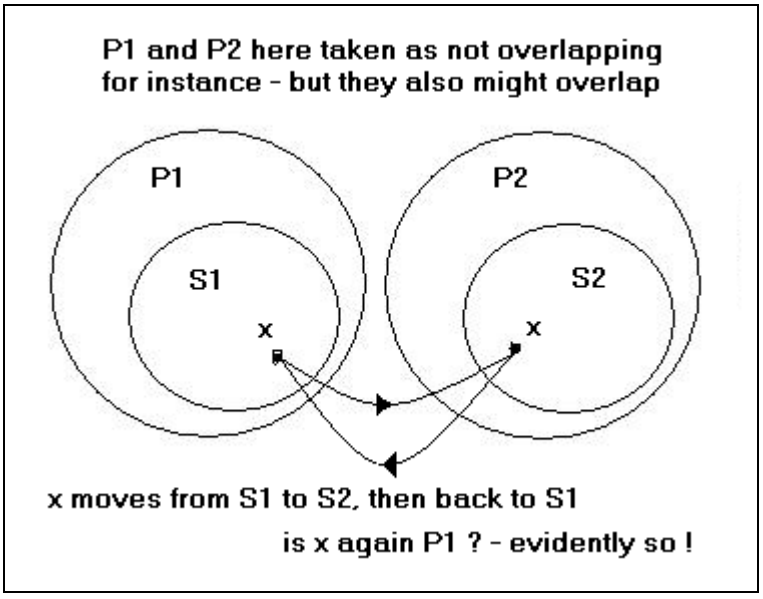
P1 and P2 here taken as not overlapping
for instance - but they also might overlap
P1
P2
S1
S2
x
x
x moves from S1 to S2, then back to S1
is x again P1 ? - evidently so !

Diagram 9a

However, R. Ishmael conceives the possibility that when x returns from S2 to S1, the relation of S1 to P1 may in the meantime have changed to "Only some S1 are P1", so that we can no longer syllogistically infer from x being S1 that x is P1.

Alternatively, the original premise "All S1 are P1" may have from the start been less general than apparent; that is, it may have more specifically been intended to refer to "All *first-time* members of S1", so that we cannot be sure whether P1 applies "returnees to S1" like x.

Thus, the preceding diagram might conceivably be revised as follows:

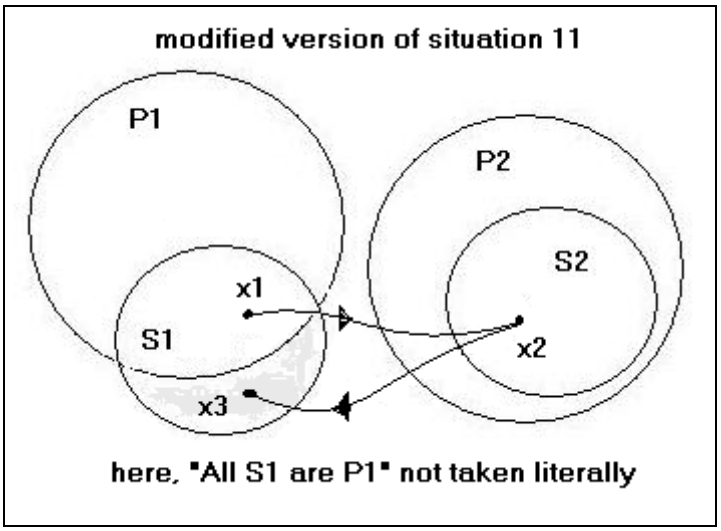

Diagram 9b

Anyhow, R. Ishmael considers the issue open, and recommends the matter be verified in the Biblical text.

10 R. Ishmael's **Rule No. 13**, the last in his list, covers many different cases, most of which cannot readily be illustrated. However, the following diagram illustrates *one example* of the dialectic often involved, where thesis and antithesis are both narrowed, and replaced by their synthesis or common ground.

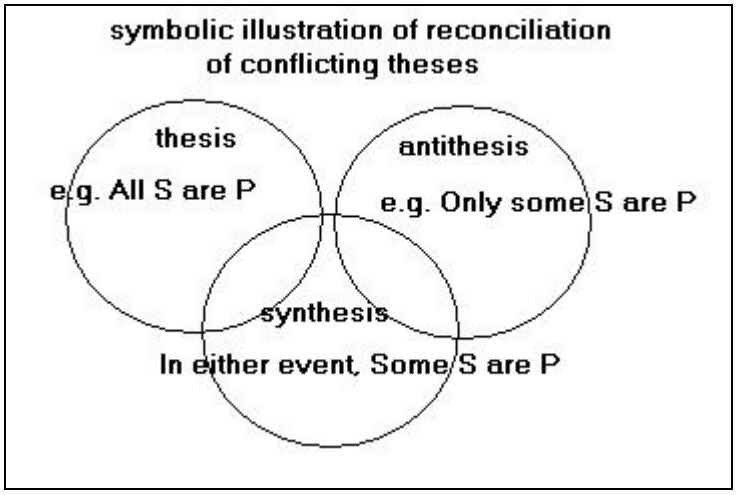

Diagram 10

This illustration is symbolic, note well, because strictly speaking (in class logic) the propositions "All S are P" and "Only some S are P" should overlap – and their common ground, the indefinite "Some S are P", would be their area of overlap.

This is just one example – the most ‘deductive’ – of how these conflicting theses might be reconciled. Other inductive possibilities would be to asymmetrically favor one or the other given theses – in which case, the selected one would constitute our synthesis.

In some (other) cases, too, it is possible to argue that the theses are not in as real a conflict as at first appears.

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396 Written in 1990, and at the time reproduced on 7 microfiches, and distributed to various university libraries in various countries (among which Canada, England, Israel, Switzerland, and the U.S.).

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	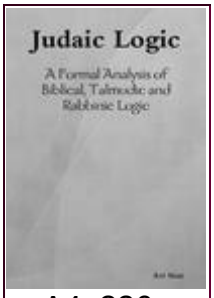	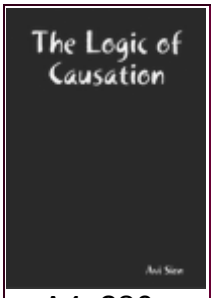	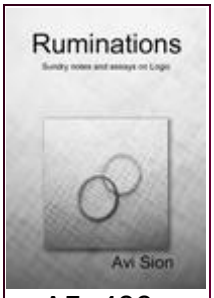	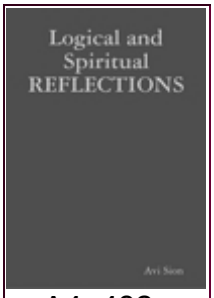
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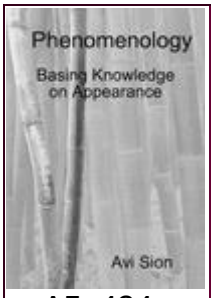	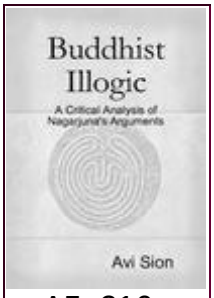		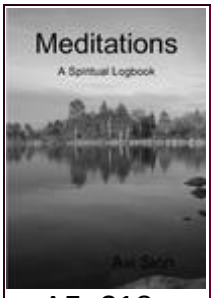	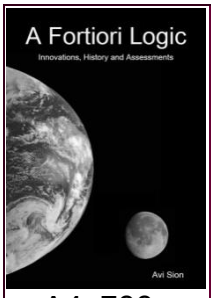
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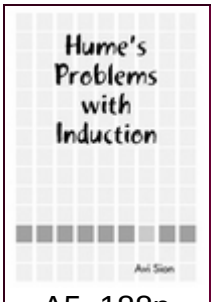	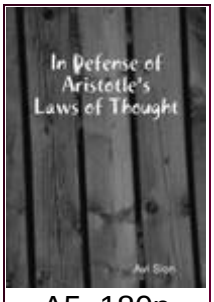		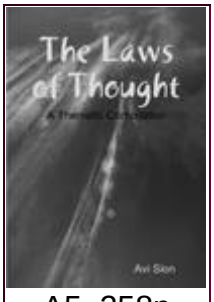	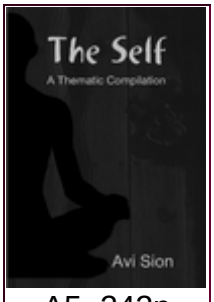
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	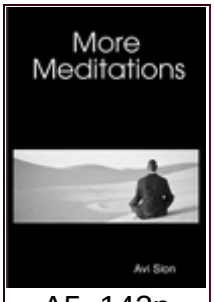	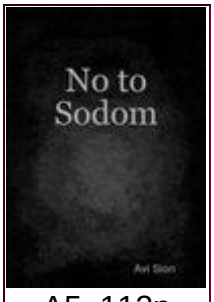	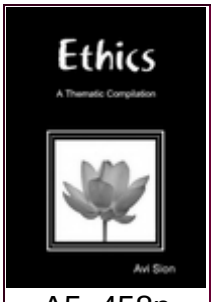	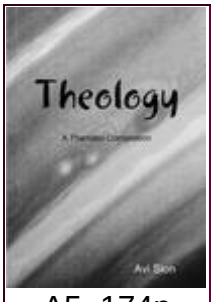
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